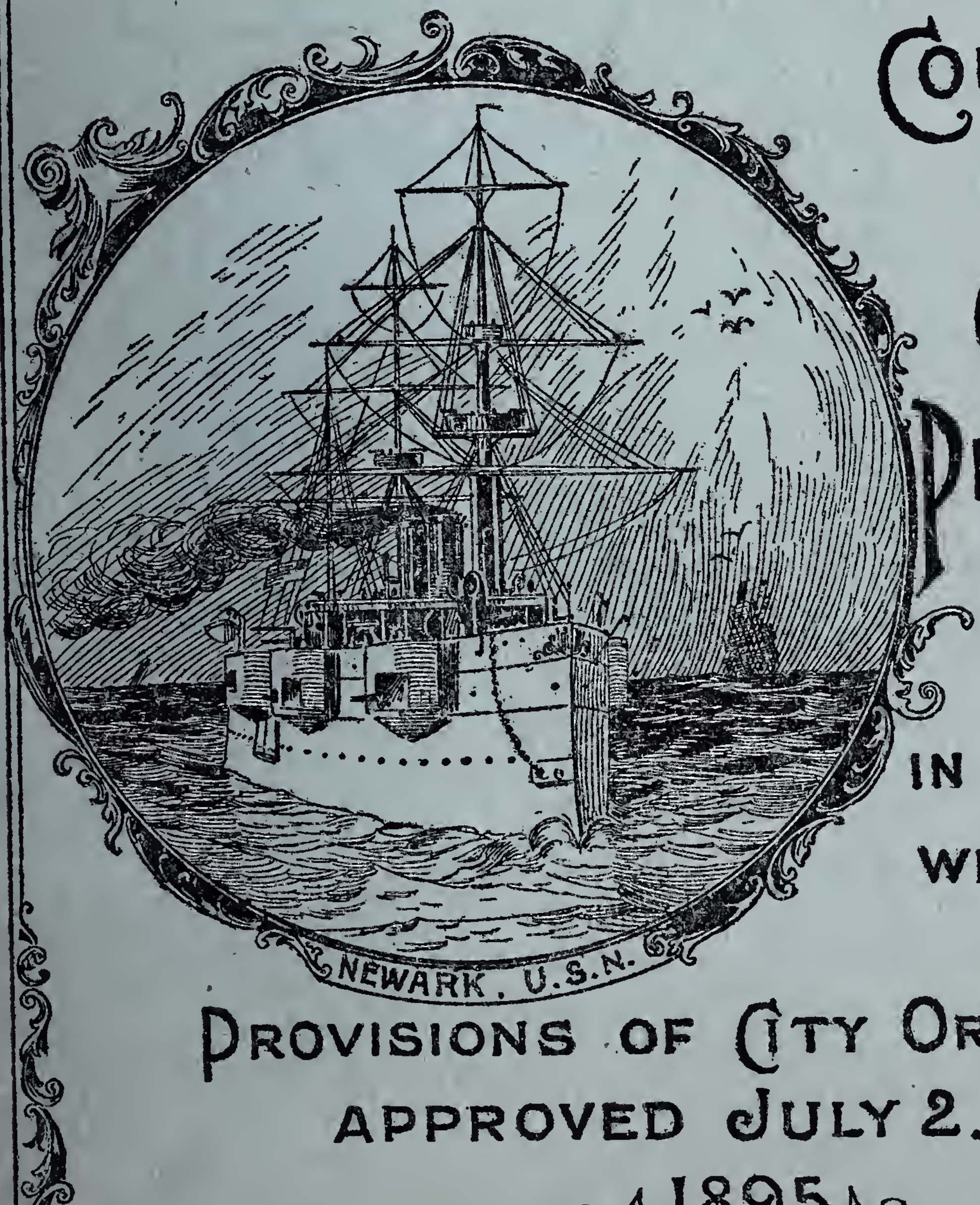
ATLANTIC COASTWISE CANAL ACROSS NEW JERSEY

REPORT

OF THE

CANAL COMMISSION OF PHILADELPHIA.

AS TRANSMITTED TO THE SELECT AND COMMON COUNCILS OF THE CITY OF PHILADELPHIA



IN ACCORDANCE WITH THE PROVISIONS OF CITY ORDINANCE APPROVED JULY 2. 1894.

1895

THE CANAL COMMISSION.

HON. CHARLES F. WARWICK, *Mayor*, President.
THOMAS MARTINDALE, Vice-President.
L. Y. SCHERMERHORN,
GEORGE W. KENDRICK, JR.,
EDWIN S. CRAMP,
DANIEL BAUGH,
JOHN WANAMAKER,
ELIAS P. SMITHERS,
W. W. FOULKROD,
HAMILTON DISSTON,
EDWARD MORRELL.

EXECUTIVE COMMITTEE.

THOMAS MARTINDALE, Chairman.
L. Y. SCHERMERHORN, DANIEL BAUGH,
EDWIN S. CRAMP, GEO. W. KENDRICK, JR.

FINANCE COMMITTEE.

DANIEL BAUGH, EDWIN S. CRAMP,
GEO. W. KENDRICK, JR.

SECRETARY.

L. Y. SCHERMERHORN, 234 Walnut street, Philadelphia.

CONSULTING ENGINEER.

N. H. HUTTON, Baltimore, Md.

ENGINEER IN CHARGE OF SURVEYS.

LEWIS M. HAUPT, 18 South Broad street, Philadelphia.

OFFICE OF
THE CANAL COMMISSION
OF PHILADELPHIA

Philadelphia, August 1895.

DEAR SIR:

This report is submitted with the COMPLIMENTS of the CANAL COMMISSION accompanied by the request that the subject of our Internal Waterways will receive your serious attention and that your active co-operation may be enlisted in behalf of this most important link in the chain of the coastwise canals for deep draught vessels.

Trusting that your organization will take early action in the premises,

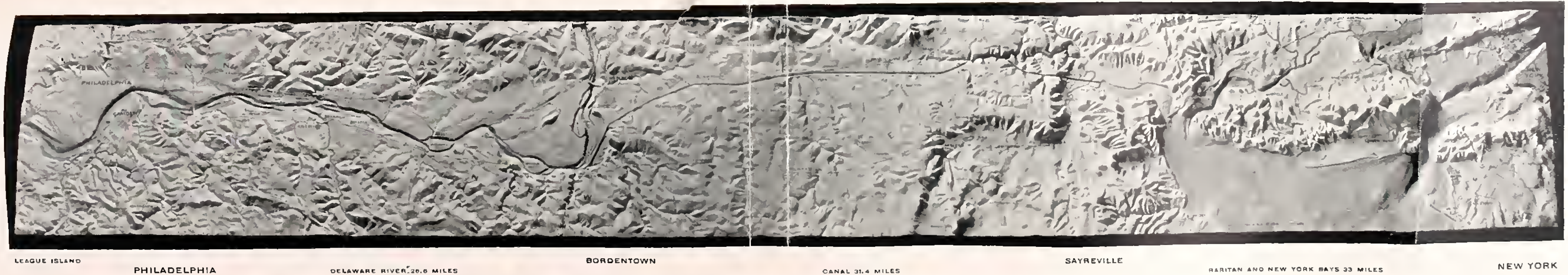
I have the honor to remain,

Very respectfully,

THOMAS MARTINDALE,
Chairman Executive Committee.

941 Market Street.

R. S. V. P.



RELIEF MAP OF THE PROPOSED ATLANTIC COASTWISE CANAL ACROSS NEW JERSEY

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REPORT

OF THE

Canal Commission of Philadelphia

AS TRANSMITTED TO THE

Select and Common Councils

OF THE

City of Philadelphia

In accordance with the provisions of City Ordinance
approved July 2, 1894

1895

BY TRANSFER
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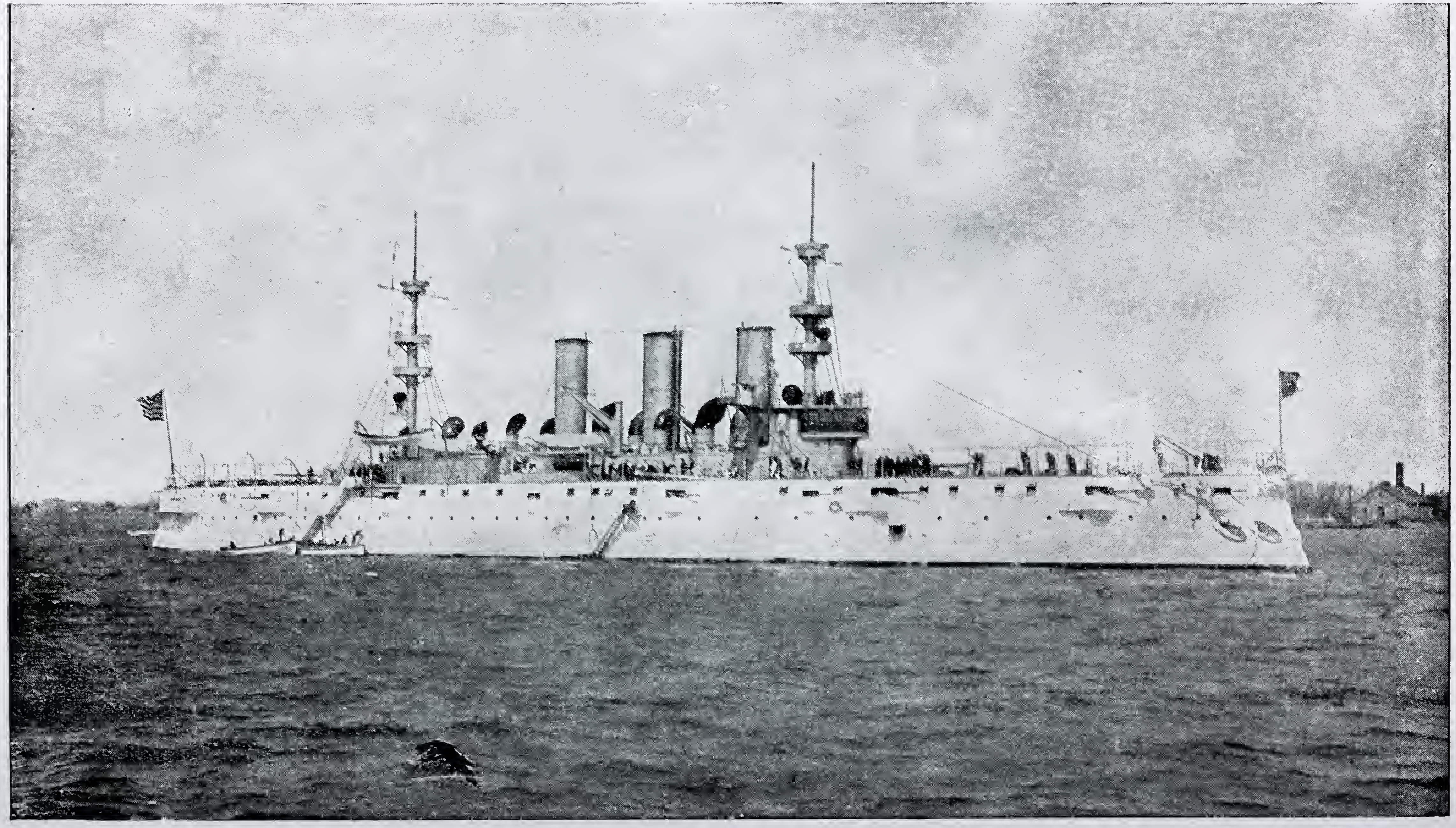
PRESS OF
AVIL PRINTING COMPANY,
PHILADELPHIA.



U. S. ARMORED CRUISER "NEW YORK." Draught, 24 feet ; displacement, 8480 tons.

Letter of Transmittal to City Councils.

OFFICE OF THE MAYOR,
PHILADELPHIA, June 4, 1895.

TO THE PRESIDENTS AND MEMBERS OF SELECT AND COMMON COUNCILS OF THE CITY OF PHILADELPHIA.

GENTLEMEN :—The Canal Commission created by ordinance of Councils under date of July 2, 1894, respectfully submits the within report of progress upon the duties assigned to the said Commission. The papers were handed to me yesterday and the report as you see is signed by all the members of said Commission. I herewith send you the said report together with a communication signed by N. H. Hutton, Consulting Engineer, addressed to the Mayor of the city of Philadelphia, together with a summary of report of the Canal Commission of Philadelphia on the feasibility of the canal across New Jersey for coastwise commerce, prepared and submitted by Professor L. M. Haupt, Engineer-in-charge.

The reports set out at length what has been done in the matter of the consideration of the important question, by the said Commission, in accordance with the ordinance of Councils above referred to and the advisability of continuing the said Commission or appointing another one is for your honorable bodies to decide.

With much respect, I am

Yours truly,

CHAS. F. WARWICK,

Mayor.

Report of Progress of the Canal Commission.

PHILADELPHIA, June 1, 1895.

TO HON. CHARLES F. WARWICK,
Mayor of Philadelphia:

SIR.—The Canal Commission, created by Ordinance of Councils under date of July 2, 1894, respectfully submits the following report of progress upon the duties assigned to the Commission:

The necessary examinations and surveys have been made to determine the most feasible route for a canal between the Delaware River and the Atlantic Ocean, and the Commission transmits herewith the engineers' report and accompanying maps and plans as the technical results of such examinations and surveys.

The Commission, although having considered the question in many of its bearings, is not prepared at this time to offer any endorsements, conclusions or recommendations upon the route under consideration, or upon the reports of its experts; but, in view of the magnitude and importance of the subject, they would suggest that it (or some similarly constituted Commission) be authorized to continue the study of the subject submitted to the Commission, and to make further report when it has obtained and considered all the facts and conditions bearing upon the question.

It is further suggested that the Commission might, with propriety, solicit and encourage the co-operation of other cities and communities to such action as would conduce toward securing the interest and action of the States and the National Government in the construction of an interior line of deep-water communication extending along the entire Atlantic Coast (and of which the route under consideration should form a part) when practicable and necessary.

Respectfully submitted,

Thomas Martindale,
L. Y. Schermerhorn,
George W. Kendrick, Jr.,
Edwin S. Cramp,
Daniel Baugh,
John Wanamaker,
Elias P. Smithers,
W. W. Foulkrod,
Hamilton Disston,
Edward Morrell.

Report of N. H. Hutton, Consulting Engineer.

TO THE HONORABLE MAYOR OF PHILADELPHIA AND PRESIDENT OF THE PHILADELPHIA CANAL COMMISSION.

DEAR SIR.—The official communication of August 10, 1894, announcing my selection as Consulting Engineer to your Commission, contained the following paragraph: "In addition to your professional services during the progress of surveys, the Commission desires to receive a final report, based upon the data furnished by the field work, and the report of the engineer in charge of surveys, as to the feasibility and cost of construction of a canal, upon the route or routes examined, together with such recommendations as may be made in the premises."

In accordance therewith, I have the honor to submit the following report:

In company with Professor Lewis M. Haupt (your engineer in charge of surveys) whose report is submitted herewith, after an examination of existing maps and a reconnoissance of the country between Bordentown and Raritan Bay, a report was made to your Executive Committee during August to the effect that but two of the suggested routes for a ship canal between Philadelphia and the ocean were considered worthy of an instrumental examination. Both of these embraced the use of the Delaware River to Bordentown, and thence across New Jersey to Raritan Bay and the ocean at Sandy Hook.

Within these limits two lines presented themselves; both leaving the river at Crosswick Creek, near Bordentown, and ascending by locks to the plateau. Thence, one connected with the Delaware and Raritan Canal, a few miles east of Trenton, followed that canal to near Kingston; thence easterly by way of Monmouth Junction to Lawrence Brook and the Raritan River, near the mouth of the former stream.

The difficulties attending the two crossings of the main line of the Pennsylvania Railroad, and the unfavorable nature of the ground between the canal and Monmouth Junction, were decided sufficient to render unnecessary any estimate of cost by this line, though the surveys made are sufficient for the purpose if hereafter desired.

The other route (and that for which Professor Haupt submits the plans and estimates) after ascending the plateau on the left bank of the Delaware, follows a line nearly parallel to the Pennsylvania Railroad, and on the southeasterly side thereof, to a point near Monmouth Junction, where it deflects easterly to avoid a trap dike, passes down the valley of Lawrence Brook to Parson's Dam (which forms a long pool) thence northeasterly, on higher ground, but avoiding outcroppings of red shale, to the Raritan River at Sayreville.

The total distance by this route to the ocean near Sandy Hook is about 78 miles; to Battery at New York, 92 miles.

By way of Cape May and the ocean these distances are about 260 and 274 miles respectively.

The canal proper is 31$\frac{4}{10}$ miles long.

CHARACTER OF THE COUNTRY.

Across that portion of the State of New Jersey which is traversed by the Delaware and Raritan Canal; the main line of the Pennsylvania Railroad; and the route now proposed for the ship canal, there exists a topographical trough or depression, having a general elevation above the sea level of from 60 to 100 feet, as compared with general elevations of from 200 to 300 feet on either side.

The surface is moderately rolling. The valleys wide and shallow, with few exceptions; the soil generally of sand, clay and gravel.

Borings were made (as shown on the general map) at a sufficient number of points to enable the character of the necessary excavations to be determined.

They indicate that between the Delaware and Princeton Junction there will be only sand, gravel and clay to a depth of 28 feet above sea level, or that of the bottom of the larger canal prism proposed. Beyond that point at varying depths below the sand and gravel will be found red shales or sandstones, though not in sufficient quantities to increase seriously the cost of excavation for the canal prism. The general character of the work in that respect will be found very favorable to low cost of execution.

GENERAL PLAN OF CANAL AND ESTIMATED COST.

Estimates are submitted for two sizes of canal prism. One, 96 feet wide at bottom, 150 feet wide at water surface, 20 feet deep in centre, for vessels not exceeding 18 feet draught.

The other, 100 feet at bottom, 184 feet wide at water surface, 28 feet deep, for vessels not exceeding 26 feet draught. In both cases it is estimated to have on one side a berm 12 feet wide.

One level is proposed from river to river at an elevation of 56 feet above mean sea level at Sandy Hook, or 60 feet above mean low water in the Delaware near Bordentown.

Both projects contemplate reaching this level by three (3) locks of 20 feet lift each, at either end of the canal.

It is proposed to economize water and time, by the use of two (2) sizes of locks for the 20 feet deep canal, and an additional one, making three (3) locks abreast for the 28 feet canal.

These locks are estimated to have the following dimensions:

No. 1, 205 feet by 24 feet with 10 feet on mitre sills.
" 2, 340 " 44 " 20 " "
" 3, 500 " 65 " 28 " "

Slopes throughout are taken at the ratio of 1½ to 1 and with the banks below water surface protected from wash by stone pitching.

The locks are estimated to be founded on piles, with timber grillage and flooring.

The masonry to consist of Ashlar facings, quoins, etc., with rubble backing.

The gates to be of most modern design of iron or steel.

The locks to be filled and emptied by culverts and pipes, as well as by valves in the gates, which, together with supply and discharge pipes, will be operated by hydraulic power, applied in the usual form for such purposes.

It is proposed to provide an electric lighting plant, with lights about locks, and at each fourth of a mile of canal line.

Suitable buildings for machinery, attendants, etc., are also included in the estimate.

As the examinations made, during and after the survey, show that the country adjacent to the line of the proposed canal is not suitable for the formation of impounding reservoirs of sufficient capacity to supply the water required, the estimates include a dam on the Delaware River, and the enlargement of the Feeder of the Delaware and Raritan Canal, which, it is presumable, can be done under proper reservations as to existing rights.

For the projects, as outlined above, the following prices have been assumed for work and materials:

Ashlar masonry	$15.00 per cubic yard.
Rubble masonry	8.00 " "
Concrete	6.00 " "
Timber (in place)	30.00 per 1000 feet B. M.
Piles (each averaging 25 feet) in place	5.00 per pile.
Earth excavation	.20 per cubic yard.
Rock "	.80 " "
Dredging	.20 " "
Stone pitching	2.00 " "

And the estimated cost of the work is as follows:

FOR THE 20-FOOT CANAL.

Excavation of prism	$6,744,000
Locks and gates	2,930,000
Machinery and buildings	400,000
Electric Light Plant	150,000
Parson's Dam and Reservoir	260,000
Dam on Delaware River	250,000
Enlarging feeder	600,000
Culverts	50,000
Bank protection	500,000
Two (2) railroad bridges	75,000
Fourteen (14) road bridges	225,000
Diversion of railroad and tunnel under locks near Bordentown	250,000
Right of way (1000 feet wide)	240,000
Contingencies at 15 per cent	1,900,100
Or a total of	$14,574,100

FOR A CANAL 28 FEET DEEP.

Excavation of prism	$10,800,000
Locks 500x65 feet and gates	3,608,000
In addition locks as for 20-foot canal	2,930,000
Machinery and buildings	500,000
Electric Light Plant	150,000
Dams as for 20-foot canal	510,000
Feeder enlargement	600,000
Culverts	50,000
Bank protection	600,000
Two (2) railroad bridges	100,000
Fourteen (14) road bridges	250,000
Diversion of railroad and tunnel under locks	250,000
Right of way	300,000
Contingencies at 15 per cent	3,146,700
Making a total cost of	$24,124,700

These quantities and estimates I believe are fair and that the canal of either prism could be constructed for the gross amounts given.

WATER SUPPLY.

Gaugings of the Delaware River above the Canal Feeder at Point Pleasant made during the extremely low water of last summer, gave a flow of 1500 cubic feet per second. As the canal with an allowance of four (4) inches per day for loss by evaporation and filtration, and on the basis of a very much larger business than could now be reasonably expected, will consume only about 500 cubic feet per second (the present canal using or wasting 120 cubic feet) the water supply of the Delaware is beyond question as to quantity.

APPROACHES TO CANAL.

The approaches to the canal, which will require improvement before the canal can be put in operation, consist of about twenty-seven (27) miles on the Delaware River, and from seven (7) to fifteen (15) miles on the Raritan River and Bay, depending on depth of water, or which depth of canal is adopted.

In order to determine with any degree of accuracy the cost of the necessary improvement of these approaches (especially the Delaware River), it would be necessary to have a systematic study of them in their relation to such improvement, and such a study it was impossible to make with the means at disposal for these surveys.

Even had such not been the case, the results would not be of any special value now, as all this work must necessarily be done by the National Government, who would undoubtedly undertake the work only on such plans and estimates as might be made by the Government Engineers. With a low water flow of 1500 cubic feet, averaging probably 2500 cubic feet in ordinary low water, and a tidal movement at least four (4) feet in height and with twenty-six (26) feet depth and over, now covering nearly one-fourth the whole distance above Philadelphia, I cannot doubt the practicability of its improvement. It is not possible now to state the cost with accuracy ; it will be from $1,000,000 to $2,000,000 for the 20-foot canal, and from $3,000,000 to $5,000,000 for a 28-foot canal.

Both streams will require extensive diking, or canalization, and like all other artificial water ways will require annual repairs.

PROBABLE BUSINESS, ETC.

It is not to be expected that the trans-Atlantic commerce will use this canal ; except for vessels in ballast passing between Philadelphia and New York for orders ; it is presumed that it will be mainly for coastwise traffic, which will be largely carried in barges or sailing vessels under tow.

Reliable statistics as to the probable tonnage to use the canal are not obtainable. The records of the present Delaware and Raritan Canal show that in 1871 over three millions of tons passed through it. It hardly seems an unreasonable assumption that this same amount of tonnage, with an additional amount of say two million tons, due to increase of business in twenty-four years, and the superior facilities of the proposed waterway, may be estimated for, making five million tons per annum.

OPERATING EXPENSES.

The expenses of operation, repair, etc., are estimated as follows per annum :

Interest on Electric plant at 10 per cent	$15,000
Operating " "	40,000
Operating gates, attendance, etc.	40,000
Repair, etc. of Locks, Dams, Feeder and Canal,	150,000
Incidentals	5,000
Total	$250,000

To cover operating expenses on a basis of 5,000,000 tons will require a toll per ton of 5 cents. To pay 5 per cent on cost of 20-foot canal, 15 cents ; to pay 5 per cent on cost of 28-foot canal, 25 cents ; or, adding operating expenses, the tolls would be 20 and 30 cents per ton respectively. As these rates are, as I am informed, less to a considerable extent than those now charged for a similar service in your vicinity, it is to be presumed that they would not be prohibitory.

SAVING IN TIME AND DISTANCE.

Under the assumption that the ordinary coastwise trader would average 10 miles, between Philadelphia and New York, by the "outside" route, and an average speed could be made of 7 miles per hour in approaches and 5 miles in the canal, and that 2 hours would be consumed by lockages in canal, there would be a saving on each trip of about 10½ or 11 hours, or nearly a day in a round trip.

This statement, however, does not represent all advantages of the interior route, as by its use the delays by adverse winds and storms are avoided and a large part of the commerce could be more economically conducted by the use of cheaper vessels than could be used for the ocean trip.

This coastwise trade between North Carolina and Boston (as extreme points) is gradually being changed to barges with independent tow boats, and it cannot be doubted that when interior waterways are provided along the coast, the larger portion of this commerce will use them. From two to three millions of tonnage would probably seek this canal were the connecting link between the Chesapeake and Delaware Bays opened.

Notwithstanding all of this "possibility," as the ability to use the canal if constructed depends entirely on the necessary improvement of the approaches by the National Government and their maintenance subsequently, I would not consider it advisable to invest any moneys for the purpose of canal construction until these essential preliminaries are entirely and firmly arranged and settled with the Government.

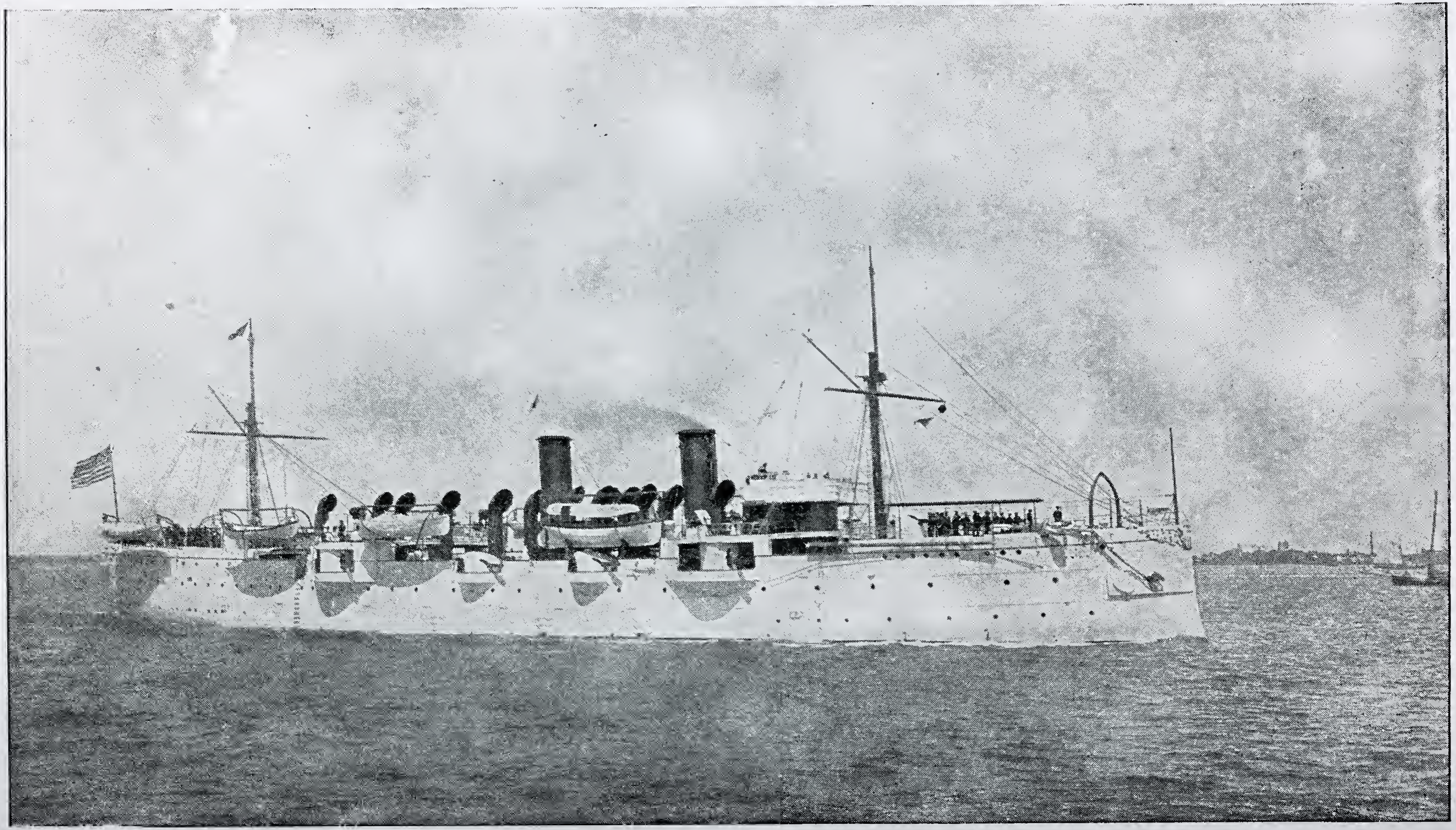
I am of opinion that this waterway would be of great value to the commerce of Philadelphia, and would be a very important link in the line of interior waterways which have been recognized as essential to coast defence as well as to commerce, and is therefore a legitimate object for aid from the General Government.

For this purpose the 28-foot deep canal (if not a 30-foot one), being necessary to pass war ships safely, and therefore the project more likely to secure Government assistance, is in my opinion to be preferred.

The greater depth is moreover desirable on commercial grounds; it is a recognized fact that with a sufficiency of water under a vessel's keel to permit control by the helm alone, there is no greater liability to "sheer" in narrow than in wider channels. Experience indicates that for this purpose a depth of 4 or 5 feet is required. The tendency of to-day is to reduce the cost of transportation by water, by increasing the size and capacity of the "carriers." Coal-laden vessels and barges constantly leave Baltimore for northern ports, drawing 22 feet and over, for whose safe and rapid passage through the canal a depth of 26 or 27 feet would be required. Grounding, or touching bottom in the canal should be impossible if it is maintained in proper condition and operated under proper regulations as to draft of vessels entering. Arguments based on the delays reported in the Suez Canal could have no force in the case of this project, as the conditions are entirely dissimilar.

Respectfully submitted,

N. H. HUTTON,
Consulting Engineer.



U. S. Protected Cruiser "Philadelphia." Draught, 19½ feet; displacement, 4324 tons.

Report of Professor L. M. Haupt, Engineer in Charge of Surveys.

SUMMARY.

Introductory.

Necessity for the canal.
Inception of the movement.
Distinctively for *coastwise* commerce.
The Call for the Meeting.
The Mayor's message to Councils.
The ordinance making the appropriation.
The Mayor and the Commission.
Basis of estimate.

The Route.

Connections with South, North, West and East.
Objections to the "air-line" to the sea.
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The physical features of the route.
The estimates for a 20-foot and a 28-foot canal.
The river approaches—with estimates.
The water supply.
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Distance and time saved—economies effected.
Traffic available.
Traffic of Delaware and Raritan Canal prior to its lease.
The experience of the Sault Ste. Marie Canal.
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Maintenance.
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Practicability demonstrated.
Benefits extensive.
Effects on railways and territory.
Times mature.
The 28-foot canal and the Government.
Acknowledgments.
Corps of civil engineers.

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18 SOUTH BROAD STREET.
PHILADELPHIA, March 26, 1895.

TO THE CANAL COMMISSION OF PHILADELPHIA:

GENTLEMEN.—In submitting this report I have the honor to state that it is rendered possible through the enlightened public spirit and civic pride of your Commission as well as through the liberality of City Councils in appropriating $10,000 for the purpose of collecting the necessary data upon which to base a reliable estimate.

INTRODUCTORY.

The general awakening to the economic advantages of waterways, the decadence in the commerce of the Port of Philadelphia, and the necessity of some measure to restore it, have led to a renewal of the interest in an enlarged waterway across New Jersey. The problem is to find the canal of least cost to construct and maintain, and which will best subserve the interests of the great bulk of our coastwise commerce, and thus stimulate the volume of the traffic, reduce the rates on raw materials, as well as the insurance, risks, tolls and time in transit, between the most populous cities of the United States.

The object being, distinctively, to increase the coastwise facilities, the draught of which is limited to depths of about 20 feet or less, the prism of the canal is designed accordingly and the estimate is based upon this limited depth, although an additional estimate is submitted to cover the case of the use of the canal for war vessels, as a strategic waterway.

It is not designed to supplant the use of the lower river for foreign or coastwise commerce, but rather to increase its traffic.

The agitation in the technical and daily press which had been carried on for some time finally culminated in a public meeting, called at the request of some 50 prominent citizens, by His Honor, Mayor Stuart, in the Executive Chamber at noon of April 30, 1894, when the subject was forcibly presented by Mr. Thomas Martindale, chairman of the Canal Committee of the Trades' League, and ably seconded by Hon. John Wanamaker, Hon. Charles Emory Smith, City Solicitor, Charles F. Warwick, Gen. Louis Wagner and others.

Call for the Meeting.

Copy of the Petition requesting His Honor, the Mayor to call a Public Meeting to consider the Question of a Ship Canal to the Sea.

Philadelphia, April 25, 1894.

To His Honor, Edwin S. Stuart,
Mayor, City of Philadelphia.

Whereas, The necessities of increasing the transportation facilities of this port and city are urgent ; and,

Whereas, Our sister City of Baltimore is taking active measures to secure a deep draught canal to the sea ; and,

Whereas, The construction of a similar canal between the waters of New York and Delaware Bay is of the utmost importance, not only to the General Government, but to the Atlantic Seaboard and tributary territory ;

Therefore, We, the subscribers, citizens of Philadelphia, respectfully request your Honor to call a public meeting of citizens in the Executive Chamber to consider the expediency of inaugurating a ship canal between Philadelphia and New York.

John Wanamaker,
A. K. McClure,
Hamilton Disston,
Geo. W. Blabon,
The Wrigley M'f'g. Co.,
W. W. Foulkrod,
Geo. W. C. Drexel,
Clayton McMichael,
J. C. Strawbridge,
Gimbel Bros.,
Hirsh & Bro.,
Blum Brothers,
H. Belfield & Co.,
D. J. Gallagher & Co.,
H. Heyman (trading as T. J. Dunn & Co.),
McCallum & McCallum,
H. Muhr's Sons,
Folwell Bros. & Co.,
R. Blankenburg & Co.,
Chas. C. Harrison,

EUGENE TOWNSEND,
A. C. YATES & CO.,
LEWIS M. HAUPT,
CHAS. W. BAILEY,
JACOB REED'S SONS,
BROWNING, KING & CO.,
J. E. CALDWELL & CO.,
GEO. E. VICKERS,
ELIAS P. SMITHERS,
WENCEL HARTMAN,
P. A. B. WIDENER,
THOMAS MARTINDALE,
PETER S. DOONER,
HUEY & CHRIST,
J. E. GILLINGHAM,
CHAS. EMORY SMITH,
LOUIS WAGNER,
GEO. W. KENDRICK, JR.,
WILLIAM M. AYRES,
R. L. AUSTIN,
A. G. ELLIOT & CO.,
C. H. GARDEN & CO.,
A. E. BRECHT,
GEORGE JONES,
GEO. E. MAPES,
CHAS. H. HEUSTIS,
JAMES ELVERSON, JR.,
HENRY VAN BEIL & CO.,
H. F. SMITH.

Meeting: Monday, April 30, 12 m., at the Mayor's office.

As a result of this meeting, and in compliance with the resolution adopted thereat, His Honor, the Mayor, sent a message to City Councils on May 3, of which the following is a copy:

OFFICE OF THE MAYOR,
PHILADELPHIA, May 3, 1894.

TO THE SELECT AND COMMON COUNCILS OF THE CITY OF PHILADELPHIA.

GENTLEMEN:—I have the honor to advise you that, complying with the accompanying request from numerous leading citizens interested in the movement to secure a Ship Canal to the sea, a large and enthusiastic meeting of representative Philadelphians, prominent in our commercial and professional life, was held at this office on Monday last, and, after a most thorough discussion of the subject, the following resolution was unanimously adopted:

WHEREAS, It is of National interest as well as of vital local importance to the City of Philadelphia that the Atlantic and Gulf Coast waterway should be developed to its fullest extent for commercial purposes as well as for a strategic and defensive measure, of which the first link is the proposed canal between the Delaware River and Raritan Bay; therefore, be it

Resolved, That His Honor, the Mayor of Philadelphia, be requested to send a communication to the honorable Councils of the city, laying before them the necessities for and the advantages and possibilities of this proposed Ship Canal, recommending the passage of an ordinance appropriating the sum of $10,000, or as much thereof as may be necessary, for the purpose of making a preliminary survey, consisting of mapping, boring and taking measurements and surveys along the proposed route, and showing a report thereon.

Pursuant to this resolution, I have the honor to place this subject before your honorable bodies, and do most respectfully request that careful consideration which its vast importance to our city merits, and recommending your early and favorable action thereon, knowing the interest you have always taken in any project tending toward the advancement of the material welfare and prosperity of the City of Philadelphia.

I am respectfully,

EDWIN S. STUART,

Mayor.

THE ORDINANCE.

In conformity with this request, the City Councils passed the following ordinance, which was approved by His Honor, the Mayor, on the second day of July, 1894, creating the

Canal Commission and appropriating the sum of ten thousand dollars for the expenses of the surveys:

An Ordinance

To authorize the appointment of a Canal Commission to make surveys for a Ship Canal between the waters of the Delaware River and the Atlantic Ocean, and to make an appropriation therefor.

SECTION 1.—The Select and Common Councils of the City of Philadelphia do ordain, that the Mayor be, and he is hereby authorized to appoint a Commission to consist of eleven persons, to include the Mayor of the City of Philadelphia, to be known as the Canal Commission, whose duties shall be to organize, supervise and direct surveys and examinations of the route of the proposed Ship Canal between the waters of the Delaware River and the Atlantic Ocean, and make a report thereon to the Mayor, to be by him transmitted to Councils with such recommendations as the said Commission may be pleased to make.

SECTION 2.—That the sum of ten thousand dollars ($10,000) be, and the same is hereby appropriated, to new item 6½ in the annual appropriation to the Mayor for the year 1894, to pay the expenses of said surveys and examinations of the proposed ship canal as set forth in Section 1 of this ordinance. All warrants shall be drawn by the Mayor, upon the approval of the bills by the said Commission and the Director of the Department of Public Works.

Approved the second day of July, A. D. 1894.

EDWIN S. STUART,
Mayor of Philadelphia.

The Organization.

The Commission, as finally constituted, consisted of Edwin S. Stuart, president, W. W. Foulkrod, John Wanamaker, G. W. Kendrick, Jr., E. P. Smithers, Daniel Baugh, L. Y. Schermerhorn, Edwin S. Cramp, Hamilton Disston, Thomas Martindale and Edward Morrell.

These gentlemen, having met and organized, selected Major N. H. Hutton, engineer of the Harbor Board of Baltimore, who has had extensive experience on canal works and surveys for the Government, as consulting engineer; and Professor Lewis M. Haupt, civil engineer, as engineer in charge of surveys.

The survey parties were organized and started at Bordentown, N. J., on August 27, 1894, and the field-work was completed October 26, of the same year. Borings were continued some weeks later to determine the location of rock and character of material. The calculations and estimates were finished about the middle of January, 1895. These were followed by the preparation and publication of the final report.

The results secured reveal a much more favorable physical condition than was at first anticipated, at far less cost for the route selected, while the commercial statistics would indicate even more forcibly than ever the great need of the enlarged waterway for our coastwise commerce, and the large traffic such a canal would command from the outset, thus insuring its success.

In the proposed Coastwise Canal the cost of the contractor's plant is included in the prices at which the work has been estimated, which are based upon current quotations for similar but less extensive contracts, so that the estimate should be sufficiently large to cover all contingencies.

THE NEW JERSEY COASTWISE CANAL.

The physical and engineering features of the problem to create a deep draught waterway between the Delaware River and the Atlantic Ocean.

Philadelphia was designed by its founders to be a great commercial centre. Its site was selected with that end in view, at the head of navigation, and restrictions were placed upon her harbor front to prevent encroachments thereon. For a century and a half she maintained her supremacy as the principal port of the United States, but the development of the internal traffic over a line of lesser resistance than that offered by the National Road, namely: by the Erie Canal and Hudson River, transferred the avenues of trade and the point of transhipment to New York. Since 1826, when the canal was opened, the commerce of the Delaware has not kept pace with that of the Hudson, and the State of Pennsylvania, hoping to compete with her enterprising rival, spent large sums of money in building an interior waterway to the Ohio, via the Old Portage Railroad from Hollidaysburg to Johnstown. These lines were subsequently purchased by the railways located along their banks and largely abandoned.

The city of Pittsburg and the entire Western section of the State is now urging the project for a deep water connection between the Ohio River and Lake Erie, at an estimated cost of $30,000,000, for a canal 105 miles long, having a prism of water 15 feet deep and 100 feet wide at the bottom.

The State of New York has by popular vote decided to maintain, enlarge and extend her system of free canals. Thus, to render more accessible the 16,000 miles of extensive waterways in the interior of our great central and fertile basin, to the navigation of the Delaware, it is necessary to penetrate the New Jersey peninsula at its narrowest point by a canal of thirty-one miles in length, and to open the Lake Erie and Ohio channel to flank the Alleghenies and bring the Eastern and Western portions of this great Commonwealth into much closer traffic relations, at much lower rates, through the free canal systems of our sister State, thus virtually extending the Erie Canal and its benefits to the Delaware and Chesapeake Bays and their tributaries.

THE EASTERLY ROUTES.

The desire to stimulate our lagging commerce by a short cut to the sea has manifested itself here, as in Baltimore, by an effort on the part of some of our citizens to secure appropriations from Congress for surveys directly to the eastward.

The practical objections to these propositions arise not only from the greater length of the canal required, the greater elevations to be surmounted, the reduction in the percentage of distance saved, and the absence of sufficient water to supply the summit levels, but of still greater moment, from the fact that as the speed in a restricted channel is limited to five miles an hour, the vessel, if propelled by her own steam, could save time by following the present natural channels to the sea via Cape May.

There are the further serious objections that such canals would be of no use to non-sea-going vessels which carry a large percentage of the coastwise commerce; they would be of no strategic value, having no defences at their sea ends and would be open to the most insuperable difficulties ot maintaining a harbor of sufficient capacity in the shifting sands of the New Jersey coast.

For the purpose of facilitating a comparison of the several routes to the sea the following data are arranged in tabular form, showing at once the great superiority of the line selected:

Route.	Length Phila. to Sea. Miles.	Greatest Altitude. Feet.	Total Excavation. Cu. yds.	Phila. to New York Miles.
Via Bordentown, ...	64.00	116	31,000,000	90.35
Rancocas and Toms River .	67.35	130	85,000,000	140.50
Bordentown and Toms River,	79.25	138	65,000,000	152.4
Via Delaware River and Bay, (outside route)	103			274.00

THE SHORTEST ROUTE TO THE SEA.

The physical conformation of the State of New Jersey is peculiarly favorable for a deep draught canal located directly in the highway of commerce between the most populous centres of the country and on the air-line to the Hudson River and Long Island Sound, teeming with traffic.

The best line to construct and operate is that one which is shortest in distance, requires least elevation or lockage, and lies nearest to the volume of trade, both through and local. A glance at the map reveals a great bay (the Raritan) extending some twenty-five miles westerly from Sandy Hook, where is situated the safest and best roadstead on the New Jersey coast, while on the other hand along the western boundary there exists a magnificent tidal river, in some places 40 feet deep and a mile wide, flowing in a direct line as if to reach the head of the Raritan Bay, leaving an intervening strip of land of only thirty-one miles in breadth between these streams.

In fact the waters of the Atlantic seaboard are as near to the city of Philadelphia at the head of Raritan Bay as at any other point along the coast, and as some 26¾ miles of this distance is already occupied by navigable streams, it leaves no doubt as to the location of the best and cheapest line for the canal.

THE TOPOGRAPHY.

This belt of country which separates the rocky highlands from the alluvial lowlands is so uniform in its topographic features that there is but one slight curve in the main line of the Pennsylvania Railroad between Trenton and Monmouth Junction, while the greatest elevation above the tide in this line is only about 103 feet.

It constitutes a low plateau, extending from the sandy bluffs 60 feet high, overlooking the Delaware, to the clay and gravel terrace, 100 feet in height bordering the Raritan.

The country is well watered by numerous streams, draining two hundred and twenty-five (225.84) square miles tributary to the summit level, and being gently undulating, it retains the water in pools and swamps so that out of the 26½ miles of this level 25 per cent is through swampy ground of little or no value for agriculture, and 2 miles will be through an artificial lake and impounding reservoir.

The numerous borings made during the survey reveal but a small amount of shaly rock lying at a low level near Monmouth Junction, and at all other points within the 20-foot limit of depth, loam, clay, sand and fine gravel are found. Even in the Delaware River, where it was feared rock might cause obstructions at one or two places, none was found at a depth of 30 feet below low water, and a profile of the river shows that a comparatively small amount of dredging will be required to secure a channel 200 feet in width at the bottom.

Only at a few points will the river channel need to be canalized. The most important being at Kinkora bar caused by confluent currents at the lower end of Newbold's Island, and at the island opposite Bordentown where a dike will be required to protect the channel from sedimentation. Similar works will also be required in the marsh flats of the Raritan to rectify the channel.

The surveys were made between August 27th and October 26th, and embraced a total distance of 59 miles, 413 feet with branches and spurs. All the streams were gauged by current metre observations during a remarkably dry season, and a careful reconnaissance was made of all practical routes in company with Major N. H. Hutton, the Consulting Engineer.

These results were resolved in the office and are submitted herewith as the basis of an estimate. Two principal routes were surveyed in detail, both starting from Bordentown near the mouth of the present canal and terminating on the Raritan below Sayreville (see map). The first crossed the main line of the United Railroads at Miry Brook, and followed the existing Delaware and Raritan Canal to Kingston, thence to Monmouth Junction were it re-crossed the railroad and followed the valley of Lawrence Brook to Parsons' Dam, near Milltown, thence it passed in a straight line to the terminus below South River. The second following the same route at the extremities, but skirted the southeasterly side of the United Railroads without crossing the line, thus occupying ground at a higher level but having the advantage of the saving of 3 miles in distance, and of avoiding the expensive and dangerous crossings of the railroad, as well as the rock excavation which was much larger on the line originally proposed. Moreover to utilize this original route would doubtless involve the purchase of the canal, and as it was estimated in 1870 to be worth with its franchise, $5,847,400, it is believed that the route selected would not only be the cheapest but the most economical to build and maintain as well as the best for commerce, and that it would interfere least with vested interests.

THE ESTIMATES.

The estimates have been divided into two distinct propositions. The first based upon the controlling idea that the great bulk of the traffic would be derived from the domestic, coastwise commerce, and that there is a sufficient tonnage of this class "in sight" to give promise of large returns to the private capital which might embark in this project; the other, a larger canal capable of passing the battle ships of the United States Navy, and which may be built by the Government under appropriation from the National Treasury.

The locks have been designed accordingly in sets of three abreast, and of sizes large enough to accommodate this traffic with the least volume of water for lockage. They are of the following dimensions: No. 1, for canal boats and barges, 205 x 24 feet; No. 2, for coastwise vessels, 340 x 44 feet; No. 3, for battle ships and cruisers, 500 x 65 feet.

The draught of No. 1 is 10 feet; of No. 2, 20 feet, and of No. 3, 28 feet, and the lift of all is uniformly 20 feet. There will be one set of tidal locks at either end of the canal, and two sets, in flights, at each side of the plateau, making six lockages necessary in traversing the entire route.

The estimate for the 20-foot waterway includes both the smallest and intermediate sizes or 12 locks in all, with 14 road bridges, 2 railroad draw-bridges on branch roads, reservoirs, feeders, a dam covering 2 miles of channel, a tunnel, the right-of-way and other contingencies as follows:

Estimate for the Coastwise Canal Across New Jersey.

General dimensions, length from river to river, 31.4 miles; depth, 20 feet; width at bottom, 96 feet; at top, 150 feet; area of water section, 2352 square feet; slopes above water, 1½ to 1 foot with a berm 12 feet wide, 6 feet above water.

Excavation for Trunk of Canal.

	Cubic Yards.	Cents.		
Earth (sand, clay or gravel)	30,000,000	@ 20		$6,000,000
Rock (soft shales)	930,000	@ 80		744,000
6 locks, sizes Nos. 1 and 2 (24 x 205) and (44 x 340) each 20 feet lift.				
Foundation excavation	700,000	@ 20	$140,000	
" timber (per M. B. M.)	9,000,000	@ $30	270,000	
" piles	30,000	@ 5	150,000	560,000
Masonry, Ashlar	80,000	@ 15	$1,200,000	
" rubble	110,000	@ 8	880,000	
" concrete	20,000	@ 6	120,000	2,200,000
Gates, locks Nos. 1 and 2, both ends				170,000
Machinery and buildings for operations				400,000
Electric Light Plant				150,000

Dams and Reservoirs.

Parsons' Dam (forming lake two miles long)	260,000
Dam on Delaware River	250,000
Feeder from Delaware River	500,000
Culverts and siphon	50,000
Carried forward	$11,284,000

Brought forward	$11,284,000
Bank protection, 330,000 feet of pitching at $1	330,000
Bridges, 2 branch railroads	75,000
“ 14 common road	225,000
Railroad and terminal deviation	250,000
Right of way, 1000 feet wide, 4000 acres	240,000
	$12,404,000
Adding 15 per cent for contingencies	1,860,600
	$14,264,600

ESTIMATE FOR A CANAL 28 FEET DEEP.

100 feet wide at bottom, 180 feet at top, having 6 sets of locks of three each, or eighteen in all.

Summit level of both, 56 feet above mean tide at Sandy Hook.

EXCAVATION FOR CANAL PRISM.

	Cubic Yards.	Cents.		
Earth (clay, sand, gravel)	42,000,000 @	20		$8,400,000
Rock (shale)	3,000,000 @	80		2,400,000
Locks, foundations, size No. 3.				
Excavation	800,000 @	20	$160,000	
Piles (in place)	21,000 @	$5	105,000	
Grillage (per M.)	12,600,000 @	$30	378,000	
				643,000
Masonry, Ashlar	85,000 @	$15	$1,275,000	
“ rubble	200,000 @	8	1,600,000	
“ concrete	15,000 @	6	90,000	
				2.965,000
Gates for lock, size No. 3				330,000
Locks and gates as per first estimate, sizes 1 and 2				2,930,000
Machinery and buildings				500,000
Electric Light Plant				150,000

DAMS AND RESERVOIRS.

Parsons' Dam (lake, 2 miles long)	260,000
Delaware River Dam	250,000
Feeder from Delaware River	600,000
Culverts and siphon	50,000
Bank protection	400,000
Carried forward	$19,878,000

Brought forward	$19,878,000
Bridges, 2 railroad bridges	100,000
" 14 common road (deviations)	250,000
Railroad tunnel and deviation	250,000
Right of way	300,000
	$20,778,000
Contingencies at 15 per cent	3,116,700
	$23,894,700

The Approaches.

As the work of improving the rivers leading to the canal, falls within the jurisdiction of the United States, it has not been included in the above estimates.

Computations have been made however, based upon the latest government surveys, showing the cost of dredging to secure the necessary channels of 20 feet and 28 feet depth at mean low water and 200 feet bottom width, as follows:

For the 20-foot Channel.

	Cubic Yards.	Cents.	
Delaware River from Philadelphia to Bordentown	1,503,767	@ 18	$270,678
Raritan River from Sayreville to deep water	1,628,423	@ 18	293,116
	Feet.		
To dikes and canalization	10,000	@ $25	250,000
			$813,794
Contingencies, 15 per cent			122,069
			$935,863

For the 28-foot Channel.

	Cubic Yards.	Cents.	
Delaware River	6,600,000	@ 18	$1,188,000
Raritan River and bay	6,500,000	@ 18	1,170,000
	Feet.		
Diking,	12,000	@ $30	360,000
			$2,718,000
Contingencies, 15 per cent			407,700
			$3,125,700

THE WATER SUPPLY.

The drainage area tributary to the summit level which is 56 feet above mean sea level, embraces 226 square miles. The average rainfall for this territory is 44 inches per annum, of which one-third, or 15 inches, could be impounded in large part, by the various reservoirs and basins suggested in the general map, but since the seasons of drought sometimes extend over six months, which would entail heavy losses from evaporation in the larger reservoirs required, it is considered more expedient to have recourse directly to the Delaware River, from which a gravity supply can be obtained by the construction of a suitable dam and feeder.

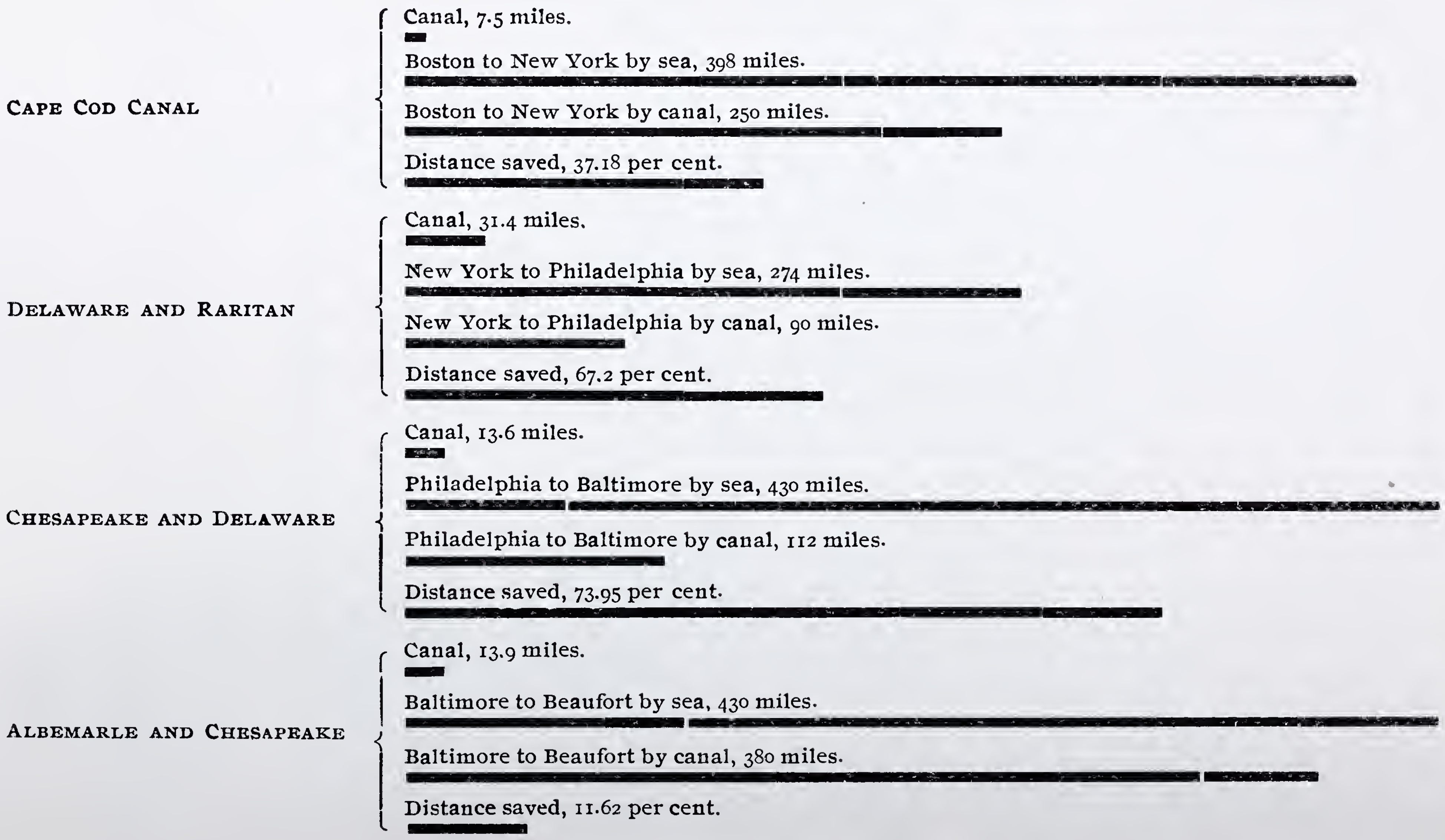
Auxiliary supplies can also be drawn from the Millstone and Raritan Rivers and from Stony Brook, should the traffic of the future justify or require more water, or the amount necessary for lockages can be reduced by the substitution of hydraulic lifts similar to those in use in Belgium and France, or of the pneumatic caissons of Mr. C. N. Dutton, of Pennsylvania, operated by compressed air.

For the passage of a traffic of 10,000,000 tons per annum as the basis of an estimate, the amount of water required would be as follows :

FOR A LIFT OF 20 FEET IN EACH OF THE CANAL LOCKS.

	Cubic Feet.
Evaporation and leakage from basins and feeders	3,014,566,000
For evaporation from canal	2,475,095,000
For operation of locks	2,142,720,000
For New Brunswick Water Supply	44,985,000
	7,677,366,000

Which is less than the yield from the catchment basin, but for the reason stated, preference is given to the Delaware River as the source of supply.



COMPARATIVE DISTANCES BY SEA AND BY COASTWISE CANALS.

Expediency.

The expediency of constructing such a short cut will depend chiefly upon the ratio of its length to the distance it would save, involving the element of time, the traffic it may develop, the population of the tributary districts, the physical obstructions to be overcome and the cost of the work; all of which will be considered in their appropriate order.

Distances Saved.

It is evident that, other things being equal, the shorter a canal is in proportion to the distance it will save, the greater will be its necessity and economy. In this particular the Nicaraguan Canal is pre-eminent; next to it comes the Suez, while in the coastwise projects the enlargement of the Chesapeake and Delaware Canal, and the opening of the new line of the Delaware and Raritan take high rank. The annexed diagrams reveal graphically the great utility of these canals in relation to the distances saved.

The Time Element.

The economy of time, however, is not so great as that of distance, for the reason that the speed of the vessel must necessarily be reduced in the restricted channels; but as a basis of comparison it may be assumed that while it will take a "ten mile" vessel 27.4 hours to steam 274 miles by the outside route, she could make the run by the canal as follows:

	Hours.
Philadelphia to Bordentown, 26 miles in	2.6
Through the canal, 31 miles at 5 m. per hour	6.2
Detention and lockage (6 locks)	3.0
Raritan to New York, 32 miles	3.2
Total for inside route	15.0

Time saved, 12.4 hours or 45 per cent.

The economy in time to sailing vessels and barges would, it is believed, be very much greater. For example, if a tow makes but 6 miles in open water, it would require 46 hours to make the trip by sea and with great risks, while by the canal she could readily make the trip in 20 hours, thus saving over 50 per cent of the time in transit.

THE TRAFFIC.

The traffic statistics are incomplete and to some extent uncertain, since in most instances only the registered tonnage is reported and much of the smaller domestic commerce is not registered, while in some cases the returns are given in values and not in tons. This is notably the case for New York City, for which the tonnage is computed at the rate of $25.00 per ton. It is believed that, for the Atlantic Coast at least, the coastwise movement of all classes will aggregate 75 per cent of the total tonnage reported so that by deducting 25 per cent for foreign commerce, there will remain the amount properly attributable to domestic traffic.

But as the clearances of one port are, or may be the entrances of another, this total should be bisected, leaving about 52,000,000 tons for the corrected, water-borne, domestic tonnage at the present time.

How much of this may eventually use the enlarged canal, when built, is a matter of individual judgment. Had the traffic on the existing Delaware and Raritan Canal not been interrupted by the lease to the railroad company, but continued to increase at the rate prevailing prior to 1871, it would now largely exceed 10,000,000 of tons

The traffic on this canal and railroad during the early years of their existence, was as follows:

Year.	Tons of Freight Camden & Amboy.	Tons on D. & R. Canal.	Passenger C. & A. R. R.
1835	6,875	57,736	147,424
1840	11,325	175,120	153,112
1850	42,242	568,403	345,425
1860	183,750	1,639,998	479,330

The freight business quadrupled each decade on the railroad and tripled on the canal. The lines were opened in 1834, hence the year after the canal was opened, it carried 8.4 times as much tonnage as the railroads; in 1840, it increased to 15.4 times; in 1850, it was 13.5 times as much, and in 1860 it was 9 times the amount.

In 1870, it was stated to have been about 4,000,000 tons, exceeding by three times the entire tonnage both ways of the Suez Canal for that year, and largely exceeding the entire foreign commerce bound in and out of the harbor of New York during the same year.* This rate of increase, could it have been continued to 1895, would give over 60,000,000 tons.

In 1866, the net revenue from the canal was $933,642.86, or 23 per cent of its value. It was leased in 1871 to the Pennsylvania Railroad Company, and the interest was guaranteed at 10 per cent for 999 years. This amounted to $584,740 per annum and the canal had been earning considerably more than the interest since 1836, but subsequent to the lease the net revenues have declined, until in 1877, they were only $80,059.91, exclusive of interest charges.

This would indicate an abnormal and expensive diversion of traffic from its natural and legitimate channel without equivalent benefits. Had provision been made for conducting this traffic by water, it would have necessitated the enlargement of the entire waterway of 44 miles with its 13 locks, but it is believed to be a much better economic problem to construct an entirely new channel 14 miles shorter and having 7 locks less, and thus increase the amount of traffic and at the same time reduce the time in transit and cost of maintenance.

In view also of the annual losses to shipping, which exceeded $1,000,000 between Cape Cod and Cape Hatteras on the Atlantic, in 1893, and the reduced rates of tolls and insurance resulting from the utilization of larger vessels and safer route, it would seem to be entirely within the bounds of probability to expect a commerce of not less than 7,000,000 tons soon after the opening of the canal for traffic and at rates less than one-half those now charged for through traffic. This would doubtless be increased by 3,000,000 tons upon the opening of the Chesapeake and Delaware Canal to full depths which would soon follow.

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*Testimony of General I. J. Wistar before the Interstate Commerce Committee, 1885.

THE SAULT STE. MARIE CANAL.

The history of the development of the traffic through the "Soo" Canal to Lake Superior, will illustrate the fallacies of those who may decry the rapid growth of commerce when facilities are afforded. For instance, it was only in 1840 when so enlightened a statesman as Henry Clay opposed the loan of the Nation's credit and public lands to this enterprise on the ground that it was "beyond the pale of civilization, if not in the moon."

This canal, opened in 1856, was enlarged in 1883, when it was thought the lock (515 x 80 x 18½) would suffice for all time, yet it is now being again increased, and its traffic in 1894 was 13,195,366 tons, valued at $142,114,502, or $10.85 per ton.

The gain in freight during this "off" year was 22 per cent, so that at this rate the business should double in five years (it has doubled in three).

The season lasted but 234 days or less than 8 calendar months. The population of the upper lake basin is sparse as compared with that of the Atlantic coast. The States bordering the waters tributary to these canals include about one-third of the entire population of the United States, all of whom would be directly benefited by the lower rates and greater movements induced by the canal, while the business of the railroads would likewise be stimulated, paradoxical as it may seem ; the best paying and most prosperous railroads of the United States are those which have the cheapest water competition.

REVENUES BASED UPON TRAFFIC.

The traffic tributary to the several bays, as stated in the official reports of the Chief of Engineers for 1893, is approximately, as follows:

	Tons.
Massachusetts Bay, about	11,000,000
New York Bay, about	95,000,000
Delaware Bay, about	19,000,000
Chesapeake Bay, about	15,000,000
	140,000,000
Deducting 25 per cent for foreign commerce	35,000,000
	105,000,000
Bi-secting for reciprocal commerce	52,000,000
Reducing to less than 14 per cent for probable tonnage,	7,000,000

EXISTING RATES.

The freight between New York and Philadelphia over the Delaware & Raritan Canal is now divided into six classes on which the tolls are as follows:

	Way.	Through.
1st class per ton (2240 pounds)	3½ cents.	$1.50
2d " " "	3 "	1.20
3d " " "	2½ "	.70
4th " " "	1½ "	.45
5th " " "	1⅕ "	.40
6th " " "	1 "	.35

In addition to the above tolls on cargo there are charges for boat tolls, steam towage on the rivers, canal towage, etc.

For sixth class freight the total charges would be:

	Cents.
For tolls, when towed by the Company's steam tugs	35
For towage, east bound, Philadelphia to Bordentown	08
For mule towage on canal to N. Brunswick (100 ton)	13
Towage, New Brunswick to New York (certain limits)	17
Lockage, (varying with vessels and cargoes) say	07
	80

The rates by rail on the lowest or sixth-class freight from Philadelphia to New York are 9 cents per hundred or $1.80 per net ton, while by the Clyde Line now using the canal, they are 8 cents or $1.60 per ton ; but even at these high figures it is stated that the United Railroads do not pay, doubtless because of the high rate of interest guaranteed and the expensive terminal charges and transfers on New York Bay. If, therefore, the coastwise freights were shipped direct by water from Philadelphia, the natural terminus, this annual loss would be largely saved, the local and through traffic would be increased in volume and could be carried at less than half the cost by water with larger profits to the transporting companies, greater benefits to the State, at lower rates to the patrons, and with equal dispatch.

MAINTENANCE.

The cost of maintenance and operation on this canal would probably reach $250,000 per annum. In 1890 the cost at the Sault Ste. Marie Canal and Locks was only $45,417.66.

WILL IT PAY?

To determine whether the canal would probably pay a satisfactory interest on the investment, there is now available the probable cost as determined from surveys ; the amount of traffic in sight ; the rate which may be safely charged to secure the business and the cost of maintenance.

As it would require a capital of $5,000,000 to cover the cost of operation at 5 per cent, it would be judicious to base calculations on a total of $20,000,000 capital for the 20-foot channel.

To pay 5 per cent on this capital would require a revenue of $1,000,000, and at 30 cents per ton for freights, the volume of tonnage must therefore be 3,333,333 tons per annum or less than one-half the amount estimated as the probable traffic. This amount of business at the low rate of

30 cents from New York to Philadelphia (⅓ cent per ton mile) would pay all expenses and leave a dividend on the cost of the works, but there can be no reasonable doubt of a much larger movement with a corresponding increment of earnings. The present shipments of coal alone, to the eastern market it is believed will nearly equal these figures, and it is undoubtedly true that "facilities create traffic."

The Suez Canal which was pronounced chimerical and opposed violently by the British press, is now controlled by Great Britain. In 1892 it paid a net profit of $8,333,333 collected from the 3559 vessels traversing the route. The shares are now quoted on the Bourse at $538, par $100, yet the tolls on the canal are about six times as great as those proposed for the entire line between New York and Philadelphia, which is almost as long as the Suez Canal, while the tonnage in sight of the New Jersey Canal is nearly equal to that of the Suez, which transported 8,039,165 tons last year. It was carried in 3352 vessels and the tolls paid amounted to $14,770,068.10.

POPULATION.

As the business of any line of transportation is largely a function of population it may be well to quote the statistics from the last census showing the population of the States bordering on this coastwise system of canals from Maine to North Carolina. The figures have been brought to date at the average annual rate of increase, with the following results:

Population from census of 1890 with 12 per cent added for five years' growth:

Maine	740,416
Vermont	372,312
New Hampshire	421,713
Massachusetts	2,507,616
Connecticut	835,808
Carried forward	4,877,865

Brought forward	4,877,865	
Rhode Island	386,966	
New York	6,717,595	
New Jersey	1,618,324	
Pennsylvania	5,888,975	
Delaware	188,712	
Maryland	1,167,476	
Virginia	1,854,697	
North Carolina	1,812,100	
	24,512,710—	34.75 per cent.
Total population United States 12 per cent added	70,536,186	

From this exhibit it appears that nearly 35 per cent or over one-third of the entire population of the United States would be more or less directly benefited by the enlargement of the waterways, while the peoples composing the financial, commercial and manufacturing centres of Boston, New York, Philadelphia, Baltimore, Washington, Richmond and Norfolk and their vicinities, embrace nearly one-tenth of the entire enumeration.

The benefits of such a deep draught waterway would not, however, be limited to the immediate territory bordering its banks, but would extend its influence to all the various industries of the country and thus tend to improve and develop our common heritage throughout all generations.

A Comparative Canal Exhibit.

A better idea of the relative cost and importance of this project can be obtained by comparing its dimensions, cost, and economies, with those of other large canals already constructed, hence the accompanying tabular statement is submitted, giving much of the available information concerning them.

From this exhibit it will be seen that the New Jersey Canal, as now designed, is about one-half as long as the

COMPARATIVE EXHIBIT OF CANAL STATISTICS.*

Name of Canal.	Depth in Feet.	Width.		Area of Prism. Square Feet	Length in Miles.	Distance by Sea.	Distance Saved.	Per cent Saved.	Length of Canal to Distance Saved. Per cent.	Estimated Cost Dollars.	Actual Cost. Dollars	Cost per Mile. Dollars.	Number of Locks	Summit Level ab. M. T. Feet.	Locks.		Total Lift.	Greatest Depth of Cutting.	Excavation. Cubic Yards.	Traffic. Tons.	Earnings. Dollars.	Rate per Ton per Mile.	Number.
		Surface.	Bottom.												Length	Width.							
Suez, original dimensions, earth	26.2	190.0	72.2	4170	100.0	3.750	3662	97.65	2.40	—	100,000,000	1,136,363	0	0	—	—	—	—	98,000,000	—	8,333.333	$2.00	1.
Suez, enlarged dimensions, earth	27.9	328.0	112.9	5412																			
Nicaragua, rock section	30.0	80.0	80.0	2400	169.4	10,000	9830	98.3	1.73	87,800,000	—	518,300	—	110.0	—	—	—	—	70,000,000	—	—	2.50	2.
Nicaragua, earth section	30.0	184.0	80.0	3960																			
Manchester, earth section	26.0	172.0	120.0	3796	35.5	—	—	—	—	—	67,351,105	1,897,214	—	60.5	600	80	—	—	52,500,000	—	—	—	3.
Manchester, rock section	26.0	130.0	120.0	3250																			
Amsterdam, earth section	23.0	186.0	88.5	3156	15.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4.
Corinth, rock section	28.0	77.4	72.2	1945	3.9	—	100–250	—	3.9–1.56	—	12,000,000	3,076,923	—	—	—	—	—	285	14,500,000	—	—	—	5.
North Sea and Baltic (Kaiser Wilhelm I.)	29.5	216.5	72.0	4254	61.0	331.0	270.0	82.0	22.6	40,000,000	37,440,000	613,770	2	0	—	—	—	98.5	69,000,000	—	—	0.18	6.
Bruges	26.26	223.0	65.6	3789	6.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7.
Delaware and Raritan, earth section	20.0	150.0	96.0	2352	31.4	261.0	184.0	67.2	17.0	14,260,600	—	457,344	6	56.0	340	44	56	80.0	31,000,000	10,000,000	4,000,000	0.40	8
	28.0	184.0	100.0	3976	31.4	261.0	184.0	67.2	17.0	23,894,700	—	700,090	6	56.0	[illegible]	95	56	88.0	46,000,000	—	—	—	
Chesapeake and Delaware	10.0	66.0	36.0	510	13.62	—	330	74.0	4.24	—	2,250,000	161,000	3	16.0	220	24.0	16	75.0	—	10,000,000	2,000,000	0.20	9
Cape Cod	23.0	20.0	131.0	3806	7.5	398	148	37.18	5.06	9,914,625	—	1,339,814	1	0	—	—	—	—	—	13,850,000	1,355,000	0.10	10.
Caledonian Canal, lake	—	—	—	—	37.5	400	339.5	84.87	17.82	—	5,000,000	217,391	—	102.0	170	40	8	—	—	—	—	—	11.
Caledonian Canal, canal	20.0	120.0	50.0	1700	23.0										170	40	32	—	—	—	—	—	
North Holland	18.5	123.5	31.0	1429	50.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4,567,551 (1852)	—	—	12.
Amsterdam	23.0	197.0	89.0	3289	16.5	—	—	—	42.0	11,250,000	15,000,000	909,090	—	—	300	60	—	78.0	6,213,000	—	—	—	[illegible]
Sault Ste Marie	16.0	100.0	68.0	1856	1.0	—	—	—	—	—	7,909,667	—	1	18.0	800	100	—	—	—	13,195,866 (1894)	—	—	14.
Chesapeake and Delaware (proposed)	27.0	178.0	100.0	3618	13.63	430	318	73.95	4.28	7,600,000	—	557,593	—	—	500	60	—	—	51,563,886	—	—	—	15.
Chicago Drainage Canal, earth section	22.0	290.0	202.0	—	40.0	—	—	—	—	28,000,000	—	700,000	—	—	—	—	—	—	26,500,000	—	—	—	16.
Chicago Drainage Canal, rock section	22.0	160.0	160.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11,500,000	—	—	—	
Welland Canal	14.0	160.0	100.0	1820	13.0	—	—	—	—	—	3,840,000	292,308	27	—	270	40.3	330	—	—	—	—	—	17.
Erie Canal †	7.0	70.0	52-56	434	352	—	—	—	—	—	51,609,000	141,394	72	—	110	18.0	656‡	—	—	4,608,651 (1880)	1,120,691	—	18.
Illinois and Michigan	6.0	60.0	40.0	300	102	—	—	—	—	—	6,557,000	64,284	15	—	110	—	141‡	—	—	—	—	—	19.
St Lawrence Canals (together)	14.0	—	100.0	—	43.5	—	—	—	—	—	—	—	27	—	270	45.0	206	—	—	—	—	—	20.
Delaware and Raritan (present canal)	9.0	60.0	50.0	685	44.0	261	158	60.53	27.85	—	4,735,000	107,613	13	—	220	—	56.0	—	—	—	—	—	21.
Albemarle and Chesapeake	9.0	68.0	—	—	13.94	430	380	11.62	27.88	509,702	—	—	—	—	—	—	—	—	—	—	—	—	22.
Dismal Swamp Canal	5.0	86–113	28–41	—	24.9	430	380	11.62	49.8	1,483,646	—	—	5	—	—	—	—	—	—	—	—	—	23.
Harlem Canal, New York	9.0	50.0	—	—	6.0	—	12	—	50.0	—	2,500,000	416,666	—	—	—	—	—	—	—	—	—	—	24.

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*See Cross Sections, pp. 46, 47, 48. † 150 miles Albany to New York. ‡ Rise and Fall.

Brought forward 4,877,865

North Sea and Baltic Canal just completed,* and the cost for similar depths bear nearly the same ratio, while for the 20-foot channel the cube of excavation is only about one-third as much and the estimated cost is about 37 per cent.

CONCLUSION.

In summarizing the features of this economic problem it will be seen, therefore, not only that it is practicable from an engineering standpoint, at moderate cost, but that it is a project which will commend itself to the financial world because of the large tributary population and traffic in sight, giving promise of handsome returns upon the capital invested and a rapid increase of business.

Its benefits will be far-reaching, as they are not limited to the immediate terminals of the route, but are co-extensive with the territory interlaced by thousands of miles of railroads and contiguous waterways, affecting mining, manufacturing, agricultural, milling and other interests, and reducing the cost both on the raw material and manufactured product; stimulating production, increasing freight movement and benefiting the entire system of transportation by land as well as by water.

RAILROADS VS. WATERWAYS.

It is a common fallacy to assume that waterways in competition with railways are injurious to the latter and it has recently been affirmed by competent authority, † "that railways which are paying dividends are running in competition with water in every case," *e. g.* The shares of the "Lake Shore" with the cheapest known interior water competition and the lowest rates, are quoted at $137, par $100.

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* The cheaper land and machinery in this country will offset the cheap labor of Europe in comparing estimates.

† Deep Waterways Convention, Toronto, 1894, L. E. Cooley, C. E.

The New York Central and Hudson River parallel with the Erie Canal is at or about par, while the Erie is quoted at 15½, although it is a shorter line by 19 miles, between the same terminals, but has no parallel water route. The New York, New Haven and Hartford competing with the Sound traffic reaches $195.50 bid.*

The construction of the Delaware and Raritan and the enlargement of the Chesapeake and Delaware Canals would also stimulate a large Southern lumber business by the inside route, as it would save one or more rehandlings, reduce rates of insurance and give prompt delivery. It would facilitate the interchange of the Eastern granites, ice, lumber and goods, with the coal, bricks, machinery, cereals and cotton of the West and South, and would augment the tonnage of the railways of the peninsulas separating the great bays of our Atlantic coastline.

Although the project is nearly a century old there has never been a time when all the conditions were so favorable; labor is abundant and cheap, interest rates low, machinery well advanced and perfected for rapid work, the right of way is in almost a primitive condition and unencumbered, the project well exploited and the population and traffic ample to justify its completion on a successful financial basis. Under these conditions it is estimated that the work could be completed in four years from the date of securing the franchises if controlled by an intelligent and energetic management.

The practical difficulty in the way of the consummation of this project arises from the fact that the Government controls the approaches, as also those of the Chesapeake and Delaware Canal, and that a 20-foot channel would not pass the largest of our battle ships.

Some stress has been laid upon the revenue to be derived from the lesser channel at its smaller capitalization of $14,000,000 as being much the more practicable of the two projects, promising greater returns as a corporate enterprise.

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*New York Stock Board quotations of February 12, 1895.

It would accommodate nearly all vessels now in the coastwise service, while the additional traffic to be secured by the larger project would not justify the additional outlay (nearly $10,000,000) by a private corporation.

Should the 20-foot canal be built by local interests, there would seem to be no reasonable doubt as to the possibility of the government being induced to create equally capacious channels in the river approaches at a cost of about $1,000,000.

THE 28-FOOT FREE WATERWAY.

Unquestionably, however, it would be far better for all interests if the United States would at an early date inaugurate the policy so long and earnestly urged by her most enlightened, executive officers, civil, army and navy, to make impregnable her bulwarks and stimulate her internal commerce by the construction of the 28-foot or even 30-foot channel between New York and Washington and thus give free passage on the interior defensive lines, to our naval vessels between the centres of wealth, business and population, now in a comparatively defenceless condition.

As such a waterway would be a public highway and free to our merchant marine, no embargo in the shape of tolls would be placed upon it, and hence the question of rates and traffic would not enter into the problem, but the country would be abundantly reimbursed for the outlay, by the revenues derived from a greatly augmented commerce.

It is stated by the French economists that the benefits conferred upon that Republic by the expenditure of over $700,000,000 upon her system of free canals and waterways, is equivalent to an annual return of 5 per cent upon this enormous capital, and it was reported by the Committee on Commerce, U. S. Senate, in 1892, that the savings on transportation effected by the St. Mary's Canal was "over $100,000,000 in two years." The same report states* "the total expenditures for water improvements of the lakes has amounted to about $30,000,000, or approximately to one-fifth of the annual saving effected in transportation.''

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* P. 9, Calendar No. 706, Senate, Fifty-second Congress, First Session, 1892.

Is there a more important economic problem before the country than the improvement of her waterways and the protection of her coastwise cities by the most effective defensive measures possible? One that will at least treble the efficiency of her $75,000,000 navy? The possibilities of this route for strategic purposes are unrivaled in the world. It is believed that this result, with the enormous interests involved, can be secured by concentration of interests for the desired end.

In closing this report, my acknowledgments are due to the members of the corps who were employed upon the surveys and in the office, and whose names are appended for their efficient and conscientious service.

Respectfully submitted,

LEWIS M. HAUPT,
Engineer in Charge of Surveys.

Through N. H. HUTTON, C. E.,
Consulting Engineer, Baltimore.

CORPS OF ENGINEERS.

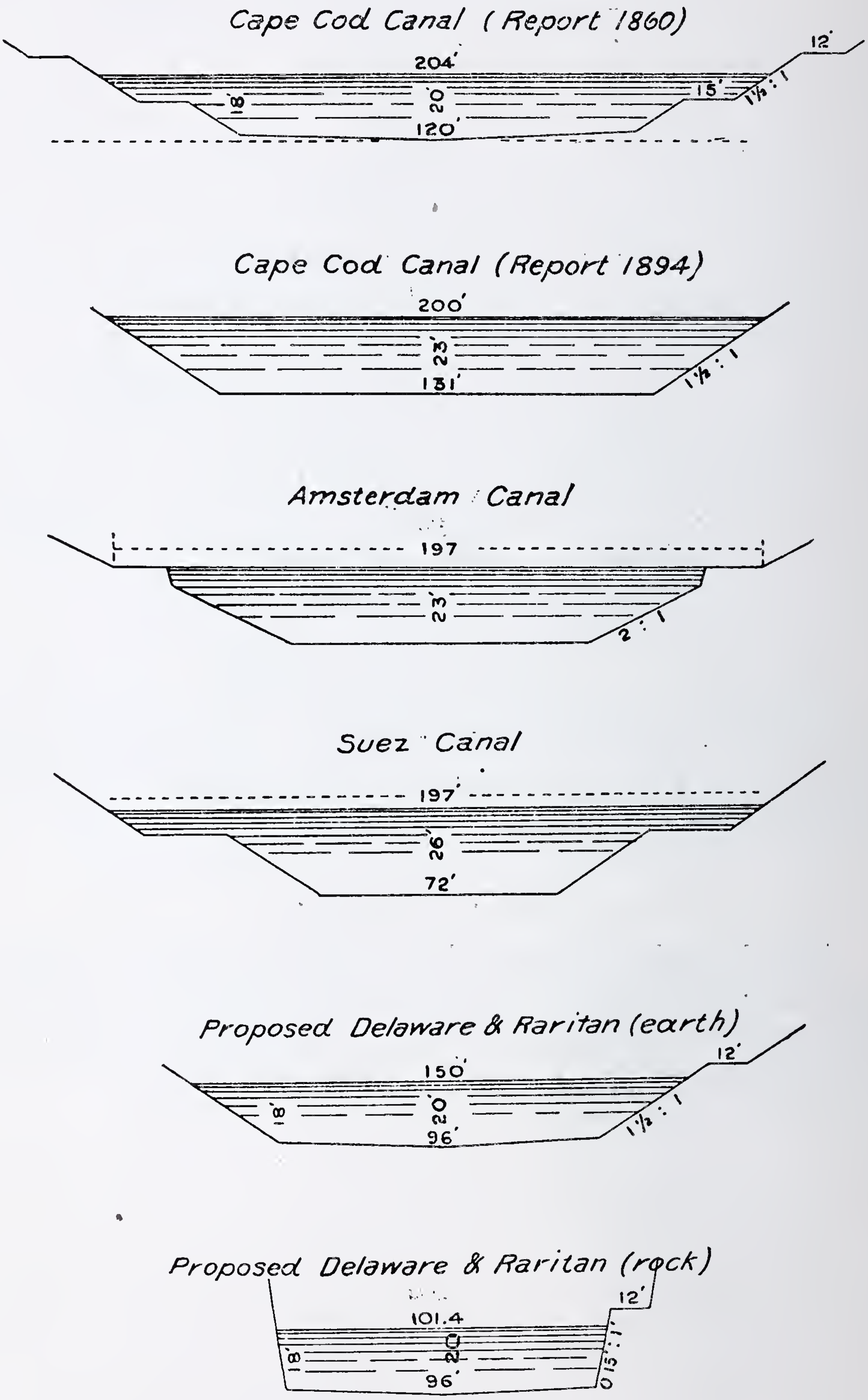
GEORGE M. LEHMAN, *Assistant in Charge.*
JAMES H. HOOD, *Transitman.*
GUSTAF GAGNER, *Leveller.*
ALEX. MURDOCK, *Topographer.*
S. S. EVANS, *Plane Table.*
E. B. HARDEN, *Draughtsman.*
T. R. BEYER, *Gauging.*
HOWARD N. EAVENSON, *Cross-sections.*
RAYMOND W. SMITH, *Inspector of Borings.*
MARION RODGERS, *Rodman.*
JOHN M. BREWER, *Chainman and Inspector.*
LUTHER SNYDER, *Chainman.*
JOHN G. HARTLEY, *Flagman.*
WM. H. BREY, *Flagman.*
J. B. MAGINN, *Plane Table Rod.*
WALTER ALLEN, *Level Rod.*
WILLIAM HAUPT, *Axeman.*

These were divided up into parties for transit, level, cross-section, plane table and borings, and the work was prosecuted rapidly, over 59 miles having been run in 51 working days.

CANAL SECTIONS.

The following exhibit of the areas of section of various canals will give an idea of their relative capacity to meet the demands of commerce and serve as a measure of comparison for the proposed ATLANTIC COAST WATERWAYS.

CROSS SECTIONS OF CANALS.



Cape Cod Canal (Report 1860)

Cape Cod Canal (Report 1894)

Amsterdam Canal

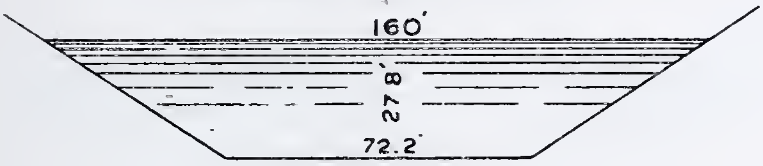
Suez Canal

Proposed Delaware & Raritan (earth)

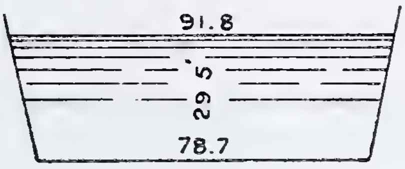
Proposed Delaware & Raritan (rock)

CROSS SECTIONS OF CANALS

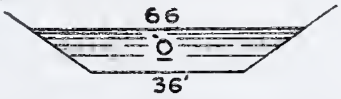
Panama (earth)



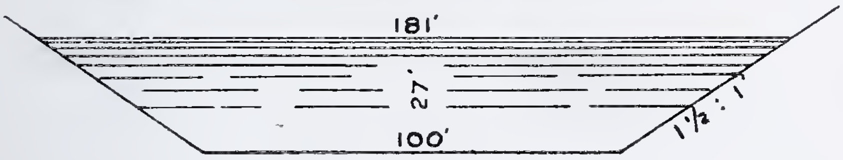
Panama (rock)



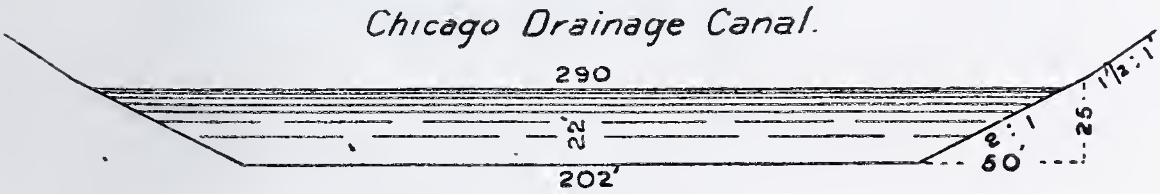
Present Chesapeake & Delaware



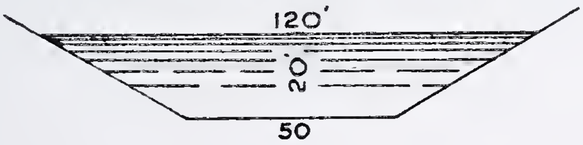
Proposed Chesapeake & Delaware



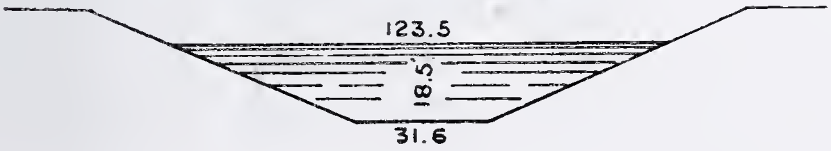
Chicago Drainage Canal.



Caledonian Canal (lake)

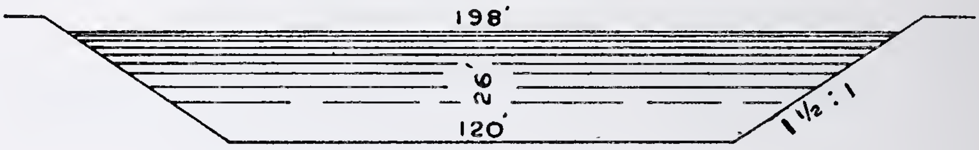


North Holland Canal.

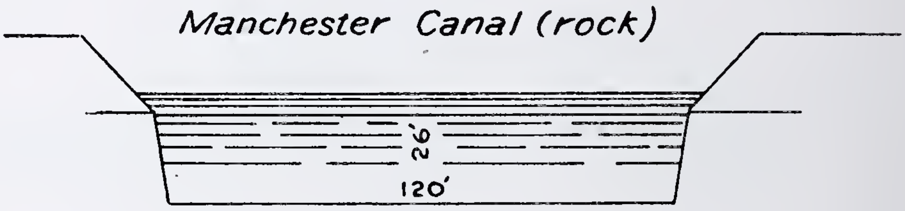


CROSS SECTIONS OF CANALS

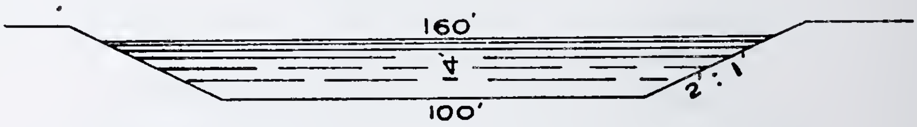
Manchester Canal



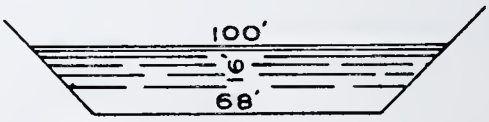
Manchester Canal (rock)



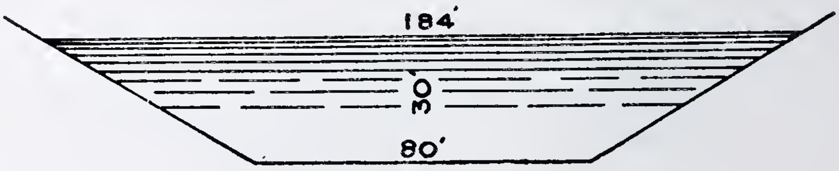
Welland Canal



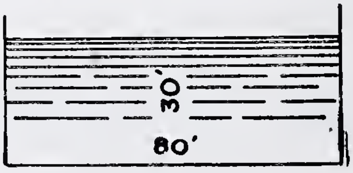
Saulte St. Marie



Nicaragua (earth)



Nicaragua (rock)



APPENDIX.

RESOLUTIONS

OF

BOARDS OF TRADE AND OTHER ORGANIZATIONS IN BEHALF OF A SHIP CANAL ACROSS NEW JERSEY.

The New York Board of Trade and Transportation.

At the annual meeting of the New York Board of Trade and Transportation, held January 13, 1892, the following resolution was adopted:

WHEREAS, In the opinion of the New York Board of Trade and Transportation, it is of national importance that the Atlantic and Gulf Coast waterway should be developed to its fullest extent as a strategic and defensive measure and for commercial purposes, of which the first link is the proposed canal between the Delaware River and Raritan Bay; therefore, be it

Resolved, That the members of Congress from this State be requested to urge the introduction of an item in the River and Harbor bill, making an appropriation of a sum not less than $25,000 for an examination, survey, and report upon a 20-foot navigable channel between Raritan Bay and the Delaware River; said appropriation to be expended by a commission to be composed of one citizen from each of the States of New York, Pennsylvania and New Jersey, to be appointed by the Governors thereof, and one officer of the United States Corps of Engineers, one officer from the Navy, and one officer from the United States Coast Survey.

Resolved, That a committee of three members of this board be appointed with power to carry the above resolution into effect.

The following committee was appointed by the President: Erastus Wiman, Orlando B. Potter, Francis B. Thurber.

The Trades' League of Philadelphia.

The following resolution was adopted by the Trades' League of Philadelphia, at a general meeting held January 14, 1892.

WHEREAS, In the opinion of the Trades' League of Philadelphia it is of national importance that the Atlantic and Gulf Coast waterway should be developed to its fullest extent as a strategic and defensive measure and for commercial purposes, of which the first link is the proposed canal between the Delaware River and Raritan Bay; therefore, be it

Resolved, That the members of Congress from this State be requested to urge the introduction of an item in the River and Harbor bill, making an appropriation of a sum not less than $25,000, for an examination, survey and report upon a 20-foot navigable channel between Raritan Bay and the Delaware River, said appropriation to be expended by a commission to be composed of one citizen from each of the States of New York, Pennsylvania and New Jersey, to be appointed by the Governors thereof, and one officer of the United States Corps of Engineers, one officer from the Navy and one officer from the United States Coast Survey.

Resolved, That a committee of three members of the League be appointed to act in conjunction with a similar committee which has been appointed by the New York Board of Trade and Transportation, and with power to carry the above resolutions into effect.

The Manufacturers' Club of Philadelphia.

The Manufacturers' Club of Philadelphia, at its regular monthly meeting, held February 15, 1892, with a very large attendance, unanimously adopted the following resolution, reported to the Club by the Committee on Commerce and Transportation:

WHEREAS, In the opinion of the Manufacturers' Club of Philadelphia, the proposed 20-foot interior waterway between New York and Philadelphia would greatly stimulate commerce, reduce rates of transportation, increase the efficiency of our navy, and promote the general welfare of the country; therefore, be it

Resolved, That the Club deems it of sufficient national importance to justify the government in making an appropriation of $25,000 for the examination and report upon the most feasible route, and hereby urges the members of Congress from this State to support such an appropriation.

The American Philosophical Society at Philadelphia.

At its stated meeting, held December 1, 1893, the American Philosophical Society adopted the following resolution:

WHEREAS, The construction of interior deep draught water communication along the seaboard is of the utmost importance in a military point of view, and would have great incidental commercial advantages in time of peace; it is, therefore

Resolved, That the American Philosophical Society respectfully memorializes your honorable bodies to make such appropriations for examinations, surveys and reports upon the more important links in this system, especially as to the connection between New York Bay and Delaware River, and between Delaware Bay and Elk River, as in your judgment may be considered sufficient to inaugurate the work.

The Franklin Institute of the State of Pennsylvania.

The Franklin Institute, at its annual meeting held January 20, 1892, adopted the following resolution :

Recognizing the national importance of the proposed ship canal to connect the waters of the Delaware and Raritan Bays in the interests of manufacturing and mechanical industries, the Franklin Institute of the State of Pennsylvania hereby

Resolved, That a committee of three of its members be appointed to co-operate with similar committees of the New York Board of Trade and Transportation and of the Trades' League and other organizations of Philadelphia in their endeavor to carry the following resolutions recently adopted by them into effect :

WHEREAS, In the opinion of the New York Board of Trade and Transportation, it is of national importance that the Atlantic Gulf Coast waterway should be developed to its fullest extent as a strategic and defensive measure and for commercial purposes, of which the first link is the proposed canal between the Delaware River and Raritan Bay ; therefore be it

Resolved, That the members of Congress from this State be requested to urge the introduction of an item in the River and Harbor bill, making an appropriation of a sum not less than $25,000 for an examination survey and report upon a 20-foot navigable channel between Raritan Bay and Delaware River ; said appropriation to be expended by a commission to be composed of one citizen from each of the States of New York, Pennsylvania and New Jersey, to be appointed by the Governors thereof, and one officer of the United States Corps of Engineers, one officer from the Navy, and one officer from the United States Coast Survey.

Resolved, That a committee of three members of this board be appointed, with power to carry the above resolutions into effect.

The President appointed as the Committee : Professor Lewis M. Haupt, Mr. Henry Heyl and Dr. Wm. H. Wahl.

WM. H. WAHL, PH. D.,
Secretary Franklin Institute.

The Engineers' Club of Philadelphia.

The Engineers' Club adopted the following resolution relative to the land-locked waterway to the Atlantic Coast:

WHEREAS, The material development and prosperity of a country is very largely dependent upon its facilities for cheap transportation; and,

WHEREAS, The cheapest known method of transit is by deep draught vessels; and,

WHEREAS, The Erie Canal, constructed and maintained by the State of New York, has proved itself to be a national benefaction to all the States of the Atlantic seaboard as well as to the Mississippi basin; and,

WHEREAS, The densest portion of the population of the United States is concentrated on the Eastern Atlantic Coast between Long Island Sound and Chesapeake Bay, where the magnitude of the interests involved and the possibility of injury from the attack of an armed foe are so great, it is of paramount importance that these sections be brought into more intimate connection by means of the shortest interior waterways; therefore, be it

Resolved, That the Engineers' Club of Philadelphia views with great pleasure and interest the general awakening, to the importance of this subject, which is now being exhibited by public spirited men and journals throughout the country and will give their best efforts, counsel and experience to aid and further any such movement.

The President appointed the following Committee to carry these resolutions into effect: Spencer McCorkle, U. S. C. and G. Survey, *Chairman;* Rudolph Hering, J. Foster Crowell, Lewis M. Haupt, Lieut. Wm. Swift, U. S. N.

The Board of Trade of Trenton, New Jersey.

The Board of Trade of Trenton, urge Congressional action in reference to the ship canal. At a meeting of the Board of Trade, held January 28, 1892, the following preamble and resolutions were adopted:

WHEREAS, The New York Board of Trade and Transportation and the Philadelphia Trades' League have passed resolutions requesting the Congress of the United States to introduce an item in the River and Harbor bill, making an appropriation of a sum not less than $25,000 for an examination, survey and report upon a twenty-foot navigable channel between Raritan Bay and Delaware River; said appropriation to be expended by a commission to be composed of one citizen from each of the States of New York, Pennsylvania and New Jersey, to be appointed by the Governors thereof, and one officer of the United States Corps of Engineers, one officer from the Navy and one officer from the United States Coast and Geodetic Survey ; therefore, be it

Resolved, That, the Board of Trade of Trenton recognizes the importance of the matter and requests the members of Congress from the State of New Jersey to use their efforts to have said appropriation made.

The President appointed Messrs. Edmund C. Hill, Coffield and Dolton to look after the matter.

The Board of Trade of Camden, New Jersey.

The Board of Trade of Camden, at the meeting held January 19, 1892, adopted the following resolutions :

WHEREAS, The Trades' League of Philadelphia have endorsed and suggested a plan for building a ship canal to connect the waters of Raritan Bay with the Delaware River, and,

WHEREAS, The New York Board of Trade and Transportation has earnestly and enthusiastically endorsed the said plan, and,

WHEREAS, The completion of such a waterway would be of inestimable benefit to Camden and the whole of New Jersey, therefore, it is

Resolved, That we heartily endorse the Trades' League of Philadelphia in their movement and that we promise the League all the support and assistance we can give them and in requesting our Congressmen to vote for the insertion of an item of $25,000 in the River and Harbor appropriation bill, towards making surveys of the proposed route by the Government Engineers.

The following gentlemen were appointed a Committee to carry the resolution into effect :

Mr. Walter Wood, Chairman ; Edward Roberts, Cooper B. Hatch, Amos W. Troth, Geo. W. Jessup.

The Board of Trade of New Brunswick, New Jersey.

The Board of Trade of New Brunswick, at its regular meeting, held Friday, March 18, 1892,

Resolved, That the board urge our representatives in Congress to favor the passage of the bill now pending providing for an appropriation of $25,000 for making preliminary surveys for the proposed route of the ship canal across New Jersey.

W. J. MCCURDY, *President*.

W. E. FLORANCE, *Secretary*.

The Board of Trade of Long Branch, New Jersey.

The Board of Trade of Long Branch, at the annual meeting held in January, adopted resolutions favoring the ship canal and appointed Mr. Benjamin P. Morris, Chairman of the Committee on Navigation, and E. G. Harrison, Chairman of Committee on Improvements, delegates to present the matter to their members at Congress.

The Board of Trade of Asbury Park, New Jersey.

The Board of Trade of Asbury Park, at its meeting, held April, 1892, passed similar resolutions endorsing the project, and Mr. E. G. Harrison was appointed delegate to present the matter in Washington.

JAMES H. BIRD, *President.*

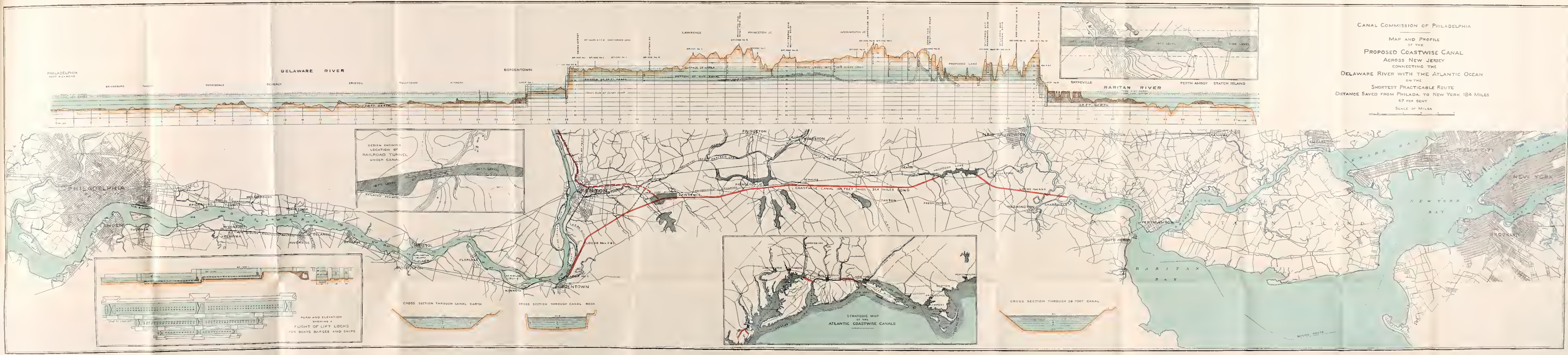
WM. F. LEROY, *Secretary.*

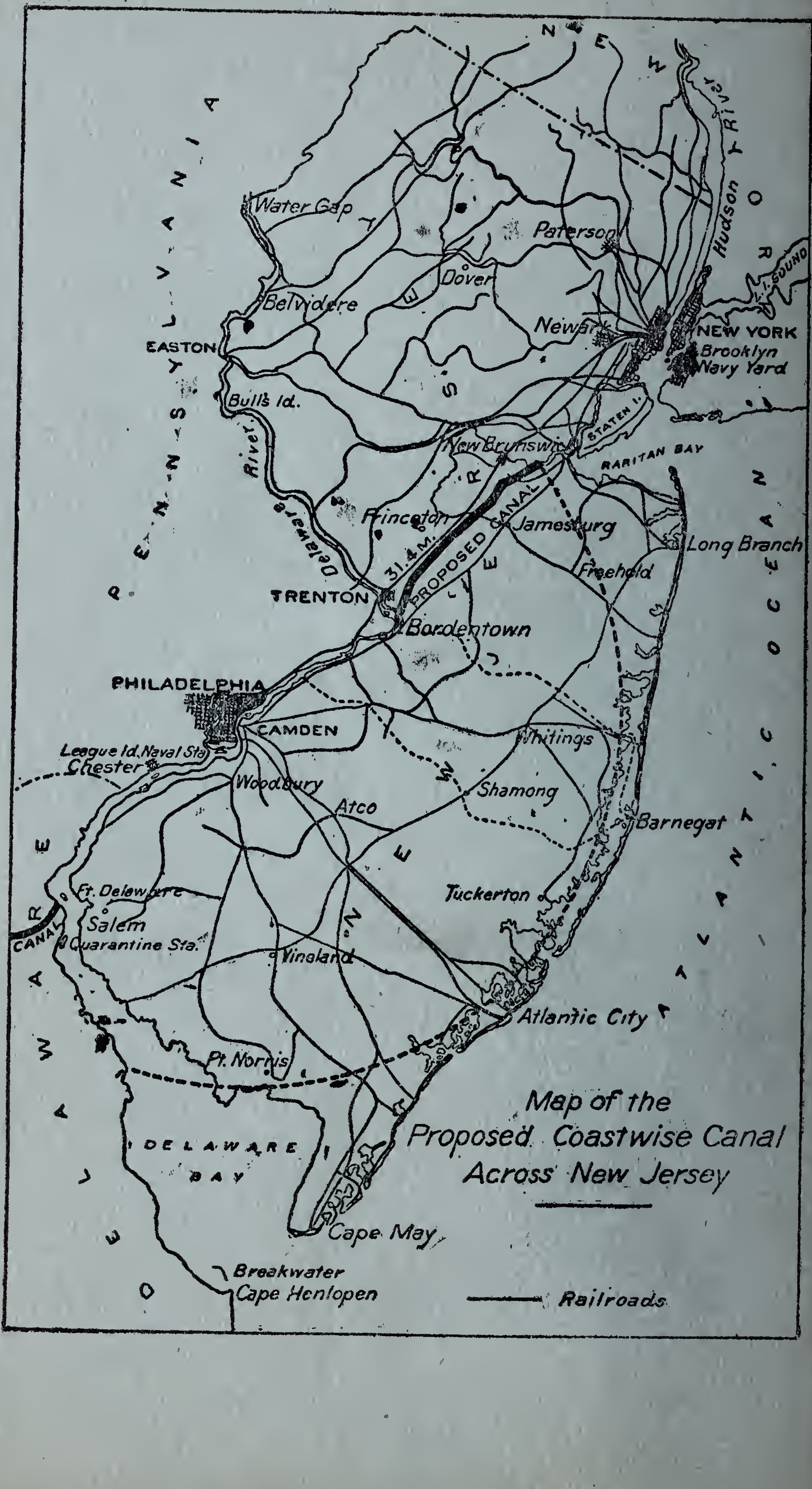
CANAL COMMISSION OF PHILADELPHIA

MAP AND PROFILE OF THE PROPOSED COASTWISE CANAL ACROSS NEW JERSEY CONNECTING THE DELAWARE RIVER WITH THE ATLANTIC OCEAN ON THE SHORTEST PRACTICABLE ROUTE

DISTANCE SAVED FROM PHILADA. TO NEW YORK 184 MILES
67 PER CENT

SCALE OF MILES





Map of the Proposed Coastwise Canal Across New Jersey